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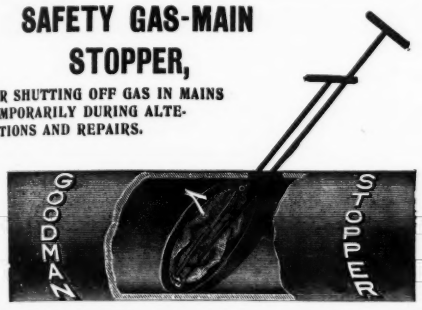

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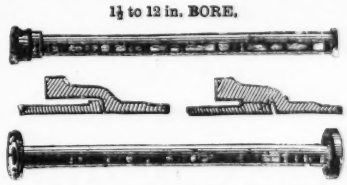

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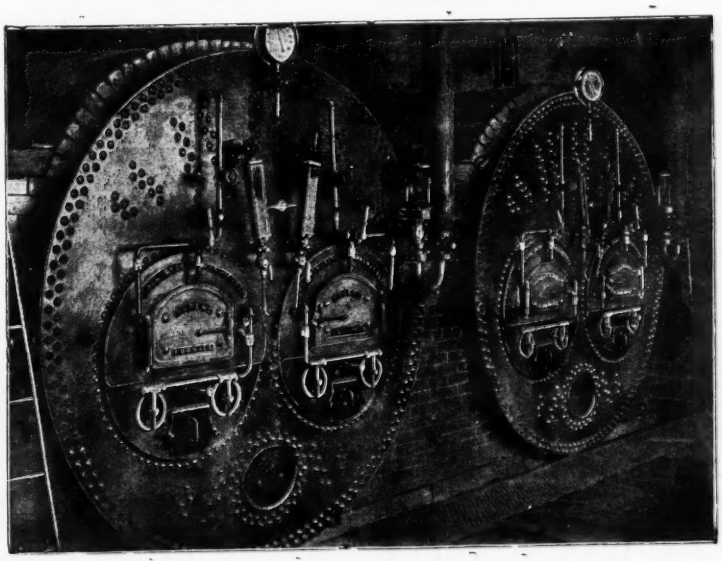

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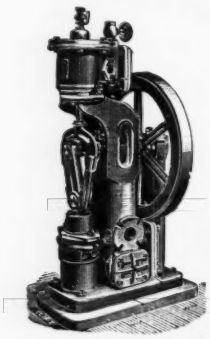

Fig. 705. "SINGLE RAM" STEAM-PUMP.

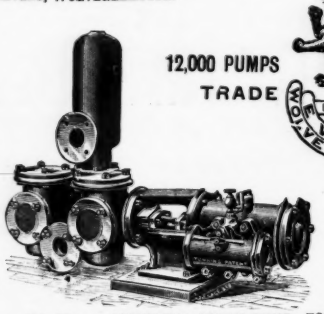

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

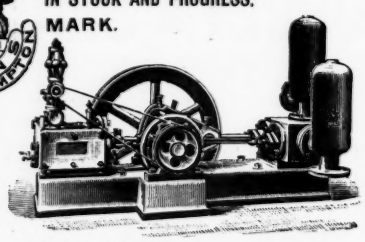

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

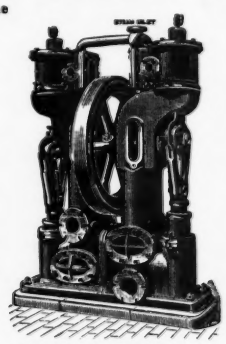

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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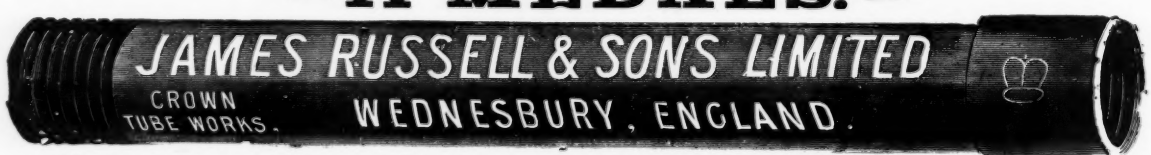

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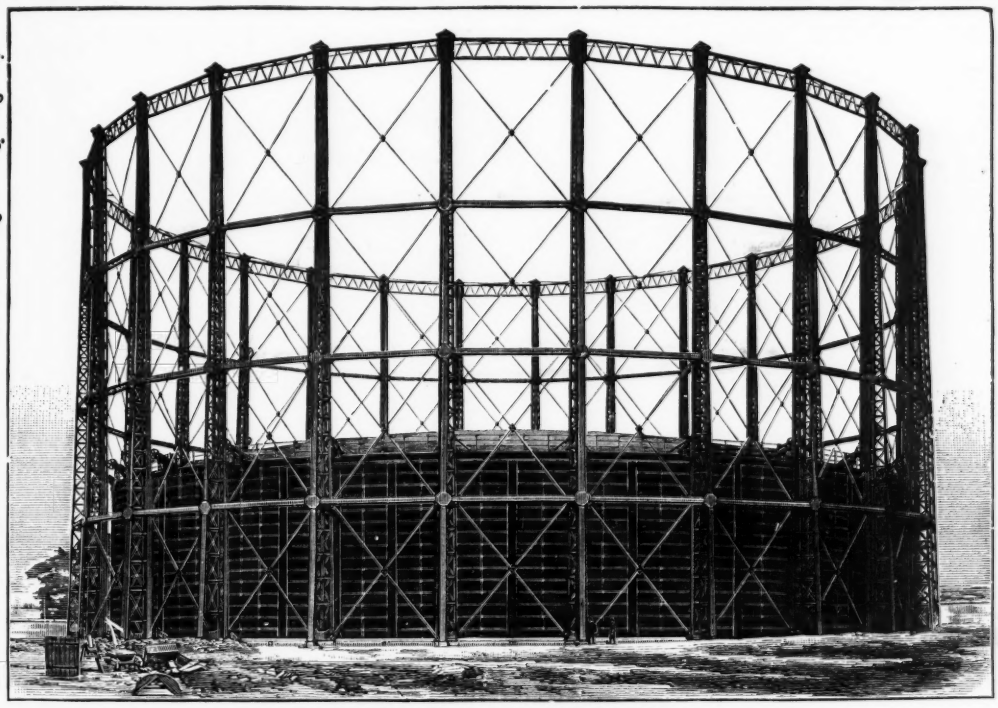

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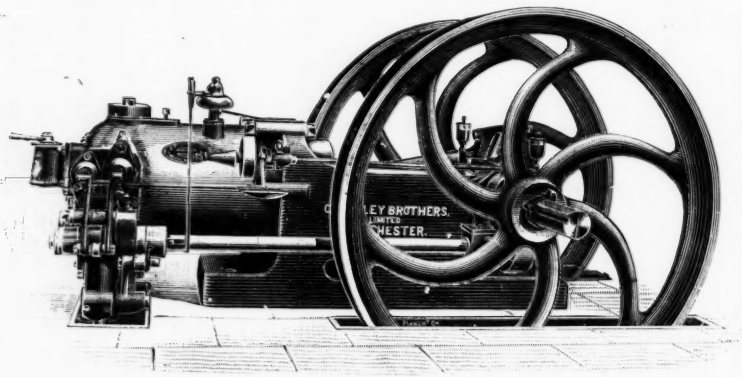

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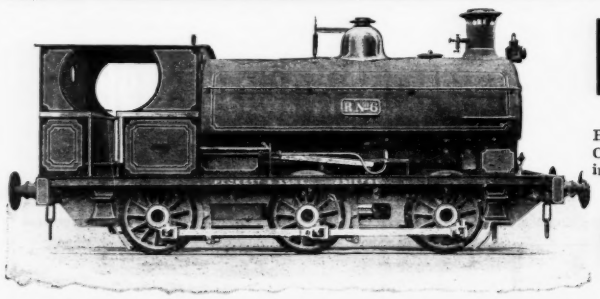

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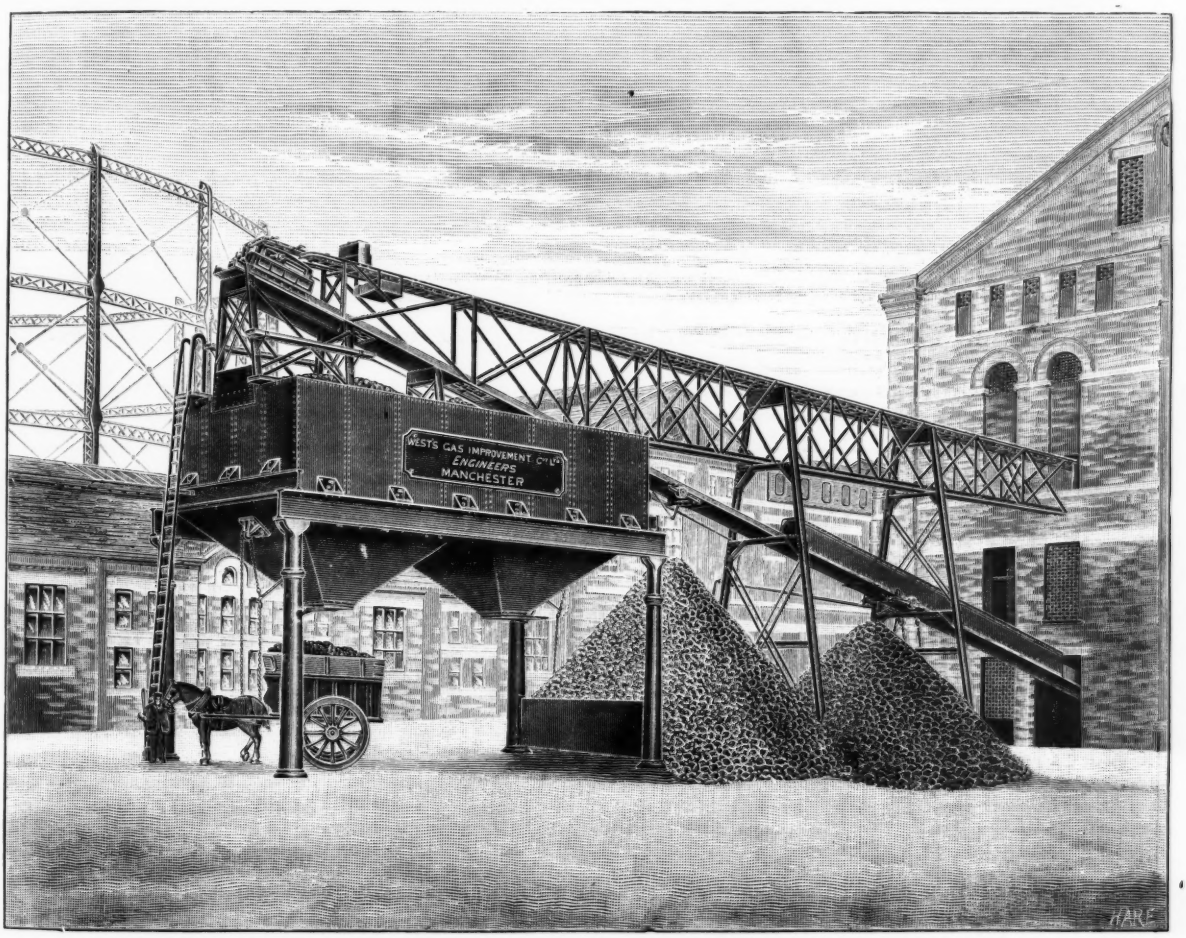

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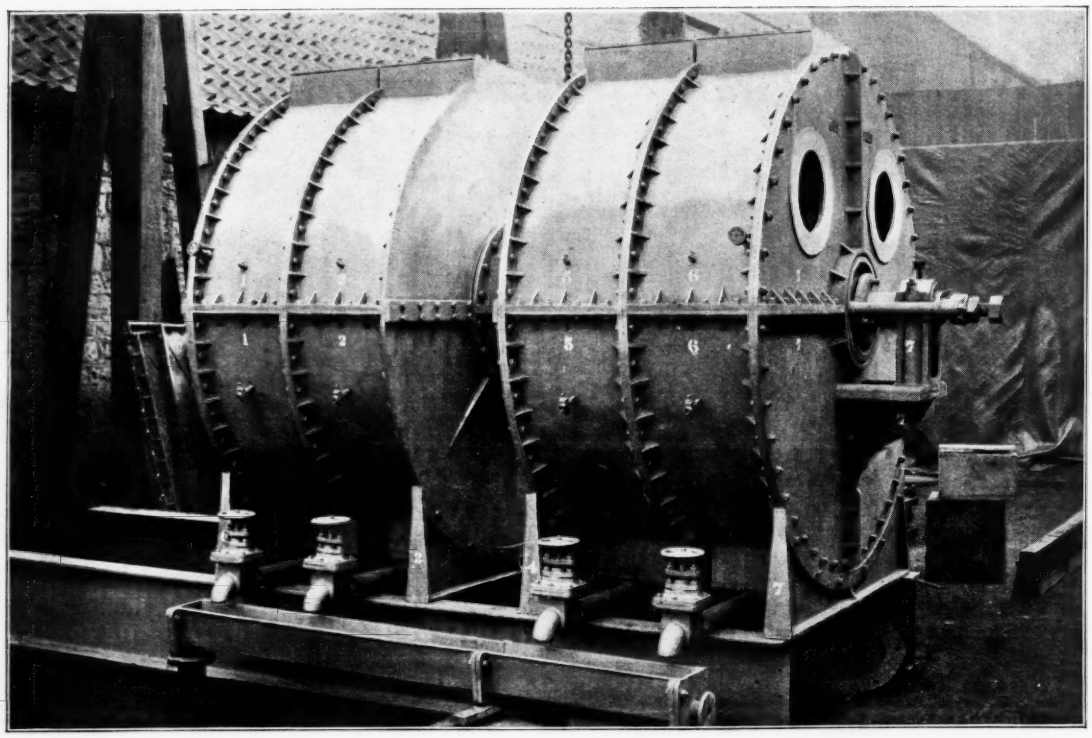

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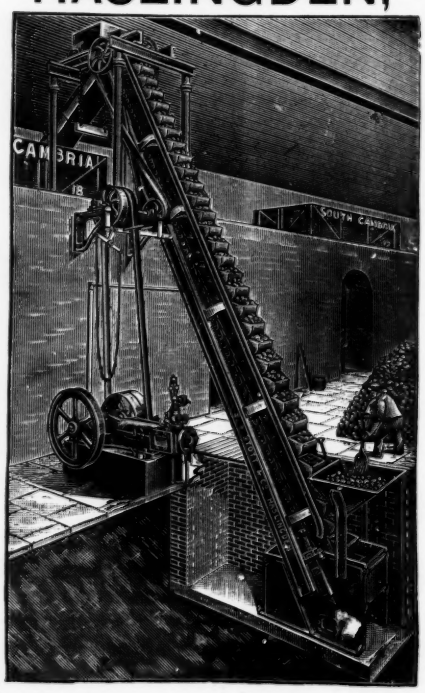

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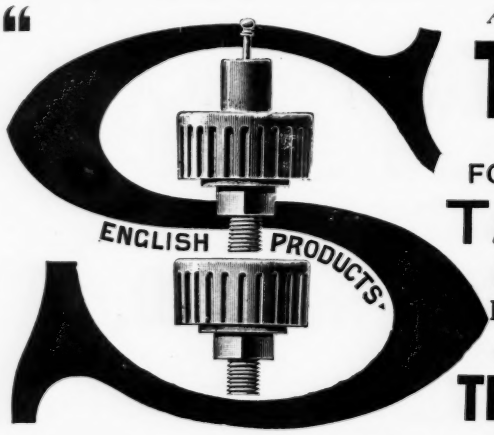

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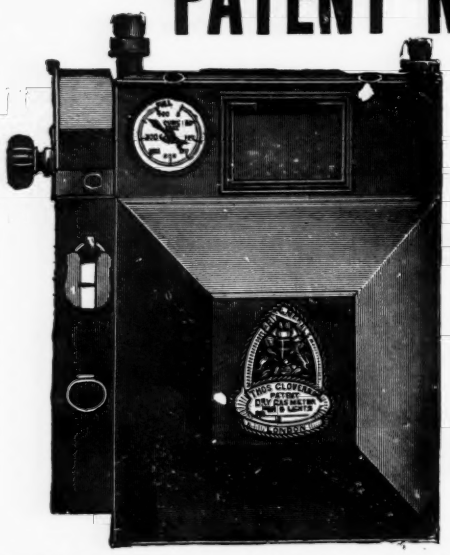

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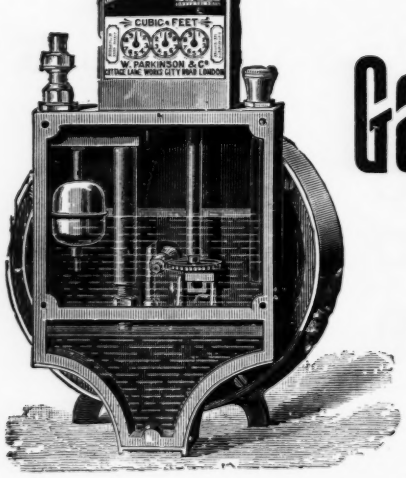

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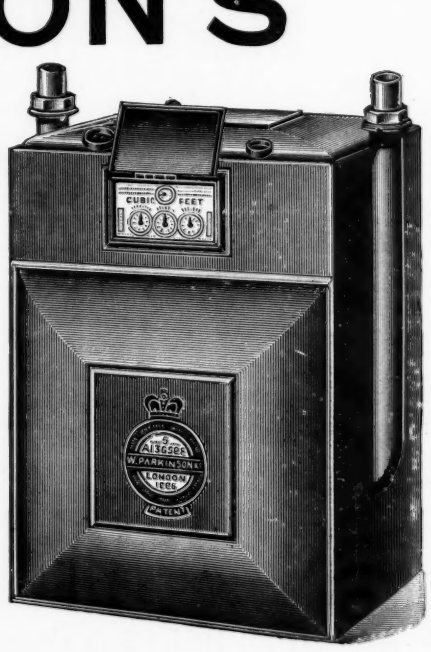

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EDITORIAL NOTES.

The Shortcoming of Technical Education.

It has been remarked of a famous English statesman, not long dead, that, with all his cleverness, his speeches mostly exhibit a great capacity for hitting the nail not quite on the head. Possibly this peculiarity might be classified as a trait of nationality, or at any rate of the national school of politicians; for very often, in the course of popular controversies, the impartial observer will notice a persistent tendency on every side to get off the right tracks. It is a commonplace that the English spirit is not logical; and not seldom is this native indifference to the syllogism counted among us for virtue. Certainly, there is a saving quality in the national mind which withholds its assent to extreme conclusions led up to entirely by a logical process, and not otherwise supported. The typical Englishman does not trust even his mathematics much farther than he is in a position to test them; and in respect to the subject-matters of all disputations, he is ever ready to declare his belief that an ounce of fact is worth a pound of theory. This sturdy English faith in the value of facts is accompanied by the striking weakness which has already been mentioned, for misdirecting such theorizing as the national genius permits itself to indulge in. An illustration in point is the contemporaneous *furore* for scientific instruction, as the panacea for all the industrial and commercial ills and failings of the British body politic. Whether these ails are grave or trifling, chronic or ephemeral, nearly everybody appears to be willing to accept the proposition that schooling of some sort is the one sovereign remedy for them all. We have never taken this view of the matter, even as regards the case of the gas industry; while strongly in favour of the fullest measure of technical instruction being provided for those in the ranks of the industry who are fit to receive, and have some prospects of needing, it. We have always gone behind and beneath the artificial structure of school systems, and contended for the prime necessity of basing all educational advantages upon the bed-rock of character and native worth, without which mere indoctrination of knowledge is utter vanity.

Is it not possible to argue from the particular to the general in this matter, and plead that what England wants for the maintenance and enlargement of her place in the world is not more schooling, but a constantly rising standard of character, and a growing volume of personal ability? The clamour of the moment seems to have become a chorus of denunciation of the ancient systems of schooling, which taught little but trained a great deal, and to be prepared to join in praise of some other plan for teaching the young Englishman everything he ought to know, before he has any opportunity for finding out what he can best do. It is not so absolutely certain as it should be for the reasonable satisfaction of those who are asked to pay for it, that the new idea of the function of schools is better than the old. Of course, the old schoolmasters were often wrong-headed and narrow-minded; and both their ideals and their ways of striving after them were susceptible of improvement. Is it so absolutely certain that the new professoriate will exhibit a better character? There are those who, with an eye upon history, hesitate to give up the grammar school for the product of the Elementary Education Act; and instinctively prefer Cambridge to Charlottenburg as a place suited for the training of men.

It is with much comfort that we find sympathy with these grossly antiquated reflections in the Inaugural Address delivered last week to the members of the Society of Chemical Industry, meeting at Bradford, by Mr. Ivan Levinstein, the President of the Society. Now, Mr. Levinstein is a manufacturing chemist; and his name bewrays his nationality. He is therefore able to speak with authority on a department of highly technical industry which is popularly supposed to have been lost to England by reason, chiefly, of the defective scientific teaching of Englishmen in the recent past; and he can tell Englishmen how they strike an "intelligent foreigner" who has been content to make his home among them. It is therefore very impressive to learn that Mr. Levinstein holds that "too exclusive importance "has been attached to superior education as a special factor "in industrial progress." Let this declaration sink into the national mind. It is well worth pondering. Not that Mr. Levinstein undervalues the place in a modern community of teaching institutions like Charlottenburg and its analogues. He only combats the dictum of Mr. Haldane, given in regard to Lord Rosebery's movement for the establishment of a "London Charlottenburg," that the erection of five or six Charlottenburgs would very greatly improve our national position. As well contend that ten professors would be so much better than one! Of course, we all love and admire Science, as unfolded to the vulgar gaze in the persons and through the speech of her professors; but too many of them would be distinctly cloying. Nor can one be certain that too large a crop of doctors of science would be good either for trade or for the doctorate itself.

The truth of the matter is, that industry and commerce owe little to Science in the abstract. Indeed, it is questionable if they are not even more indebted to that ancient Learning, which had no more to do with practical life and trade than has abstract Science. For Learning humanized the minds it touched, though never so slightly. Science does not. The latter-day world has been over-impressed with the obvious inadequacy of the old scholasticism to equip with the tools for his life's work the eager youth whose native powers ran in the direction of big guns, or curative surgery, or the investigation of the secrets of the Cosmos. Charles Darwin himself lamented as completely thrown away the time he lived in Cambridge, distastefully grinding Greek and Latin verbiage; but nobody else would venture to estimate the value to Charles Darwin, the seer, of the training which helped to mould his gift of clear and convincing expression. So it is with others, who do not know how much they are indebted to the old scholarship for the training of the gifts of the spirit, for the formation of a sound taste in the employment of the written and the spoken word, and for preservation from soul-destroying influences which mere knowledge is powerless to repel.

The English-speaking peoples need their schools of technical information; just because it would be calamitous for those of the rising generation who possess the natural ability to profit by such knowledge, and the taste for it, to lack the advantages which such institutions, when they are properly conducted, are competent to offer. The Napoleonic ideal, of the opening of career to talent, is the rule of efficiency for such arrangements of the politico-educational system. Where the brains and the bent occur without the money necessary for sustaining the deserving student through his course, the money should, in a perfect State, be forthcoming. Even in this imperfect England of ours, lack of funds is not invariably an irremovable impediment to the rise of talent; and one may well hope that, in due time, it will disappear from the category of students' disabilities. It would be a bad day for England, however, if it were ever to be held as an article of faith by English people that Information, however scientific or technical, is the one thing needful to assure the well-being of a State. Not to mention higher considerations, even in matters of industry and commerce the need for men to do the work must precede the call for improved methods. Success goes before Science. The professors never start an industry; they "get a lift" on the motor-car which they had no part in making. This is all right, so long as they know their place to be that of a passenger. Followers of the gas industry are duly grateful to Science when it explains how the incandescent burner acts, and applies measurement to achieved results; but they know better than to wait for the professors of Science to originate a branch of business which shall be capable of yielding bread-and-butter. Charlottenburg is the concomitant of German industrial prosperity, not the cause thereof. There are even Germans who prefer Old Heidelberg.

The "Ring," Profits, and the Man.

THE subject of "rings," "cartels," and "trusts," is one of perennial interest for men in business, who are of necessity both consumers and producers. The Germans provide some very striking illustrations of the organization of trade with the purpose of ensuring that prices shall not be depressed by competition below a remunerative level—which is, in essence, the reason for all such arrangements, by whatsoever name they are called in different countries. There is room and use for a thoroughly competent and impartial handbook of modern commerciai methods, incidentally describing and explaining these words, which appear unhappily to arouse emotional controversy whenever they are mentioned. There was an International Chemical Congress recently held in Berlin, at which the subject of the influence of cartels and trusts in the chemical trades was discussed in a very practical spirit. It appeared from the tone of the papers and speeches that, whatever the German chemical industries owe to the high education of those practising them, more reliance for the realization of a sufficient manufacturing profit is placed on agreed prices. The question was asked, whether laws could be properly framed to regulate cartels and trusts with the object of preventing their operation from injuring the consumer; and it was ultimately resolved that the answer must be in the negative. The Congress made the formal declaration that "the inter-"vention of the Legislature in the matter of trusts is neither "necessary nor desirable." During the course of these proceedings, Dr. Simon, of Düsseldorf, advanced with conspicuous success the plea that progress in any industry only occurs when it is flourishing and paying satisfactory profits. This almost seems to read like a truism; but, upon further consideration, it reveals itself as one of those really profound statements which are not so simple as they look. It implies the principle that the first object of solicitude in regard to any industry is not the case of the consumer, but the prosperity of the manufacturer and supplier. It may be translated as the antithesis of what has come to be the British rule of regarding the consumer first and last. "Remove every-"thing that appears like an advantage to the supplier, and the "consumer must benefit." This is the English theory. The German view enunciated by Dr. Simon is: "Ensure that the "supplier shall rejoice in a profitable business, and the con-"sumer will benefit eventually." The two views of one truth are not really antagonistic, but complementary.

It may be argued that Parliament, in making gas companies' dividends reasonably secure, and fixing gas prices accordingly, really acts upon the principle here attributed to the German doctor. That a gas supply must first be profitable, then as cheap as possible, is a realization of this rule. Naturally, the hasty and ill-informed public writing and speaking of the day heaps contumely upon private enterprise and joint-stock company trading, for keeping profits and dividends in the forefront of consideration; and the whole strength of Socialism is based upon the assumption that the influence of profit-making and profit-sharing can be eliminated with advantage from every kind of business. It is a large assumption, which will require more proof than has hitherto been forthcoming of the existence of any support in fact. The alleged successful carrying on of gas supply in the United Kingdom by local authorities is always put forward as this kind of proof. Accepting the fact, it is susceptible of a quite different explanation, which is the true one. Municipal gas supply in this country is kept as progressive and efficient as it is, simply by the motive power of the professional honour and individual ambition of its managers. It is not necessary to mention the names of the living; but it is indisputable that the reputation of the gas supply of Glasgow was that of the late Mr. Foulis. He stood before the world for Glasgow gas; and the Corporation of Glasgow were wise enough to recognize his merit. Some other gas supplies that might be cited are examples of the opposite effect. As completely municipalized as that of Glasgow, they were left without competent headship; and they simply stood still, in the technical sense.

Thus it is easily seen to be impossible to dispense with the motive power of gain, using the word in its broad and honourable significance, from the most advantageous conduct of the affairs of the work-a-day world. The individual power is and must be that which drives the universe. The private adventurer becomes converted into a company; the company may be nationalized or municipalized out of existence. These are forms. The one-man power remains. He is the reality. It must be worth somebody's while to do the best work, if the average standard of performance is to remain reasonably good. The only community of modern times in which the motive of personal gain and advancement is supposed to be scorned by the virtuous is China. Never in the history of the world has the hope of honourable distinction and reward been denied to meritorious performers, without the ruin of the system. If the fittest had not survived, what would the Earth be like? It is unthinkable. Wherefore, those sciolists of the cheap newspaper and the cheaper platform who would vainly pretend that the world will be the better when the labourer is no longer deemed to be worthy of his hire, do greatly err. Moreover, by "making believe" that one man is always as good as another, and never better, these people prepare the way for their masters—the strong men who hold by facts and not by words, and become tyrants less by their own will than by the force of circumstances and the desire of the helpless multitude.

Unprogressive Electric Lighting.

THE slowness of electric lighting appliances to exhibit any physical improvement as time goes on has often excited remark. In connection with the movement for reducing the nominal illuminating power of gas, it has been abundantly proved that the interest of the consumer does not suffer, seeing that if he elects to use incandescent burners he can always obtain six or seven times the lighting effect legally attributed to the gas. If the consumer prefers to use the most inefficient type of burner known, it is his own fault if he chooses the very worst of its kind; and by taking a little thought, he can usually get a very much better light without additional expense. Curiously enough, no public authority seems to mind how cavalierly the electricians serve their public; and the increase in the voltage of lighting currents to more than double the original figure has been sanctioned everywhere, notwithstanding the circumstance that the change has absolutely stopped all improvement in the ordinary carbon lamp, which is nowadays actually less efficient in converting current into light than were the lamps of twenty years ago.

We notice in a recent report that a batch of lamps were lately tried for lighting effect and endurance at the Electrical Standardizing Institution; and they took an average, over their 700 hours' lifetime, of 4·13 watts per candle power. Our electrical contemporaries used to gird at us years ago for unfairness to incandescent electric lamps in rating them at 4 watts per candle. Yet the latest are worse than this—working at 216 volts. Whether by a misprint or intentionally, these lamps are described as having an "inefficiency" at starting of 4·05 volts. There is many a truth disclosed by a misprint. These particular lamps were of about 13-candle power, although the testing Institution returned their duty in "Hefners"—which, of course, made them look a great deal better on paper. It is little short of an outrage that an English photometrical test should be given in Hefners, which are only seven-eighths of a standard candle. The natural supposition is that there must be some special attraction in this unit, the nature of which, from the salesman's point of view, can be readily surmised. The guileless Teuton, with his broken English, cannot tell the difference between Hefners and candles! What we are specially desirous of pointing out in this connection is the slaughtering of the value of the carbon filament lamp by the high voltage distribution current, which is entirely to the loss of the consumer. A remedy for this, in the case of sufficiently large users of electric light, is to generate the current themselves by means of a gas-engine and dynamo made to supply at 50 volts, which is the most economical pressure for all lamps. The local gas company ought to be able to arrange this alternative.

Position of the Fiscal Question in Parliament.

THE Parliamentary Session is drawing to a close. Already the last pieces of necessary legislative business, such as the Expiring Laws Continuance Bill, have made their appearance among the Government Orders of the Day. Soon the members of the House of Commons will be scattered over the face of the earth; and yet those daring statesmen who from the Treasury Bench have boldly dragged the Free Trade system of the country into the arena of discussion,

have not been driven from their places with ignominy. This must really be a very alarming reflection for those who, a year ago, would have as soon expected the law of gravitation to be challenged as Free Trade to be revised. Why the professional leaders of Free Trade opinions in the House and the country did not arise in their might, and send the Government packing at the very first intimation that the Colonial Secretary and the Prime Minister had their doubts about the sufficiency of the traditional fiscal system of the United Kingdom, must be a source of wonderment to themselves. Certainly, the rank and file of those who have fancied themselves Free Traders by conviction, whereas it was merely from fashion, are gravely troubled over this timidity of their chiefs. It is felt to be a very tame way of receiving an attack upon what it had become customary to regard as the foundation of British trading supremacy. Can it be that the venerated thing is only a fetish after all—a sort of "Long Ju-ju," needing to be cleared away in the interest of advancing civilization? An uneasy suspicion that something like this may turn out to be the truth has been encouraged by the slackness of professing Free Traders in not grappling with questioners of the dogma in the very beginning. And when the Trade Unionists rushed in where the ex-Cabinet Ministers feared to tread, the ordinary man naturally began to reconsider his prejudices.

From the moment when it appeared that the proposal for a rational re-examination of the national fiscal system in the light of acquired experience and future possibilities was not to be dismissed off-hand as preposterous, the popular feeling in favour of an inquiry has steadily grown. Now we have all classes of specialists taking part in the great inquest—not as theorists orating in generalities such as only a few months ago passed for orthodox Free Trade doctrine, but as traders and taxpayers who know what they are talking about. One of the latest contributors to the available stock of information concerning the difficult subject of protective tariffs is Mr. Levinstein, who, in his Presidential Address to the Society of Chemical Industry (noticed elsewhere), took occasion to point out that wherever these tariffs are imposed, they operate against the most highly-finished articles of British manufacture. Whole districts of Lancashire and Cheshire are languishing in consequence of the barriers set up by foreign nations, which were once their customers, against the importation of their manufactures—such as silk and velveteen goods. The moment that British skill and enterprise successfully launch a new product on the world's markets, the Protectionist States try to get possession of the means of production. They take the tools, and the raw materials, and the workpeople; and when they can manufacture for themselves, up goes the tariff to a prohibitive figure. Then they export their surplus to England, and sell it under cost price! If this is Free Trade, it wants inquiring into as badly as though it were called by any other name.

A Dignified Protest.

It will be with very mixed feelings that those interested in the gas profession will read the particularly dignified protest addressed by the Directors of the South Metropolitan Gas Company, through the Secretary (Mr. Frank Bush), to the London County Council against the evidence given by Dr. Clowes, the Chief Chemist of the Council, before the House of Lords Committee on the Crystal Palace Gas Bill. There can be nothing but satisfaction with the step taken by the Board, and nothing but regret that such action on their part should have been rendered necessary. The extract from the official shorthand writer's notes which is attached to the protest contains the statements of which the Company complain; and certainly most people will agree that it would be difficult to draw from them any other inference than the one which the Directors deduce—"that of persistent and deliberate fraud by the Company." The seriousness of Dr. Clowes' statements is enhanced by the fact that this is not the first occasion on which he has given utterance to them, so that they cannot be said to have arisen from insufficient consideration on his part of the question at issue. Indeed, the repetition of the evidence is one of the matters to which the Directors take special exception, inasmuch as when Dr. Clowes placed his "so-called facts" before the Commons Committee presided over by Mr. Oldroyd, in 1900, the London County Council's "Portable Photometer Bill" was rejected, and that of the Company, authorizing a reduction in the illuminating power of their gas, was passed. When asked what he wished the Committee to understand from his evidence, Dr. Clowes merely invited Counsel to draw his own inference from it. But though Dr. Clowes exhibited this reluctance to state in so many words his opinion of the Company, the Board have had no such scruples in putting into plain language their opinion of Dr. Clowes. After stating that they cannot conclude their protest without expressing their great regret that the relations of the Council with the South Metropolitan Gas Company are in their present unsatisfactory condition, they remark that, "with such an adviser as Dr. Clowes, they are not at all surprised that the misunderstanding exists, to the general disadvantage, but especially of their partners, the consumers." We shall be curious to see what (if any) reply the London County Council see fit to make to this straightforward communication. At any rate, the individual members cannot plead that their attention has not been properly drawn to the grievance the Company feel with regard to the parliamentary evidence tendered on behalf of the Council.

The Dutch Gas Managers' Association.

The report of the recent annual meeting of the Dutch Association of Gas Managers will be perused with interest by our readers, more particularly as reports of this kind enable English engineers to get a bird's-eye view of what is going on in the gas industry in other parts of Europe, and how practice abroad differs from that in England. There is one point which, even at the risk of laying ourselves open to the charge of reiterative persistency, we have to call attention to—namely, to the phrase of the Prince of Wales, "Wake up England." It appears from our correspondent's remarks that in a country like Holland—close to our shores, practically speaking our language, and easy of access—it is possible for a large works such as those of Haarlem to be built without aid from English constructional contractors; and seemingly this is by no means an isolated case. English work being second to none in the world, and there being no personal prejudice against the English, it appears that it is simply from lack of energy and enterprise that the place of the English is being filled by Germans and others. The situation is the more to be regretted as in past years English gas engineers, as is well known, have always taken a very prominent position on the Continent; and we can only express the hope that those interested will lay the matter to heart for their own advantage and the prestige of the country to which they belong.

Some Points in Continental Gas Affairs.

There are two or three points in the speech of Mr. R. Hesketh Jones at the meeting of the European Gas Company in which those who have the direction of gas undertakings at home will find interest. The general prosperity of the Company (notwithstanding drawbacks peculiar to Continental conditions) and the lengthening of the average duration of their concessions need not be enlarged upon. But when prolonging concessions the Company have to submit to some reduction of the prices paid for gas. In this lowering of prices, their experience is that of most undertakings in this country; and that is, the cheapening results in an expansion of business. The illustration of this given by the Chairman is rather an extraordinary one, although it only applies to the short period of a month. He stated that the Manager at Amiens had reported that the consumption last month was 45 per cent. in excess of June, 1901; and he attributed this to the stimulating effect of the reduction in the selling price of gas. In connection with this question of consumption, the figures quoted by the Chairman as to the use of gas between sunrise and sunset also carry their tale of excellent work in developing the business in other directions than lighting. Over seven stations, the consumption in that period of the day ranges between 29 per cent. in the case of Boulogne up to 41 per cent. at Bolbec and 43 per cent. at Caen. These percentages illustrate the importance of fostering to the utmost the use of gas for cooking, heating, and motive power. In at least two cases it is seen that but little more and the day consumption will balance that during lighting hours. Mr. Jones also showed the hardship of the coal tax of 1s. per ton on gas companies situated as the European Company are. They now pay about £6000 a year under the

tax; and this falls entirely upon the shareholders. Under the concessions, the Company are bound as to the top price to be charged to the consumers; and that price includes octroi of 2s. 10d. paid to the Municipalities per ton of coal sent into the towns and cities. However, the Chairman clings hopefully to a statement recently made by the Chancellor of the Exchequer, and looks for deliverance in whole or in part from the 1s. per ton tax. It may also be noted as a point worthy of compliment and publicity, that last year the pensions paid by the Company amounted to no less than 6s. 8d. per cent. on their paid-up capital.

An Intermittent Water-Gas Process.

In a paper read before the recent meeting of the German and Swiss Associations of Gas and Water Engineers—an abstract translation of which appears elsewhere in to-day's number of the "JOURNAL"—Dr. Alph. Steger deals exhaustively with the production of simple water gas by the continuous and intermittent processes. After fully explaining the various ways in which the first-named system might be carried out, and the difficulties which these present in practice, Dr. Steger turns his attention to the intermittent method, and enumerates the conditions which must be observed in order to secure as great a yield and as economical working as possible by this means. He then describes the plant for operation on the intermittent system as invented by Drs. Kramers and Aarts, in the construction of which, it is stated, all these conditions have been kept in mind. Dr. Steger completes his paper by quoting some figures taken from a report drawn up by the officials of the Amsterdam Gas-Works, after a fortnight's test of an experimental plant having a capacity of 4400 cubic feet per hour, which has been erected at Dongen. It will be seen that the results of the trial were of a highly gratifying nature, and such as to render the system deserving of the careful consideration of gas engineers.

The Fruits of a Dilatory Past.

After reading the first part of the experiences that Mr. W. G. Quicke, of Perth (W.A.), has communicated to his professional brethren at home, we are convinced of one thing—that, so far as those experiences apply to gas suppliers in the Colonies, the blame for the backwardness in the matter of incandescent gas lighting ought not to be charged so much against the want of appreciation on the part of the public as against those who should a long time since have educated the public in such matters, and they are the gas suppliers themselves, though, to be just, it must be remembered that they have been to an extent, until quite recent years, handicapped by the prices of incandescent burners and mantles. Mr. Quicke has been the Manager of the Perth (W.A.) Gas Company a comparatively short time, and, reading between the lines of his communication, he has been kept very busily employed in combating the extreme notions and prejudices which he found existing at the time of his arrival on the scene of his present labours. But how came those notions and prejudices so deeply rooted? Simply through the neglect of the gas suppliers, who allowed the purveyors of another form of illumination to come in and educate the people until they were "well versed in the use of electric lighting;" and those who taught were, we should imagine, not at all dilatory in helping to a stronger growth the weeds of prejudice against the old form of lighting. It is only of late years that, according to Mr. Quicke, colonial gas-works have started to emerge from the lethargy which characterized English gas undertakings some twenty years ago. Then all we can say is that such undertakings (we do not admit that Mr. Quicke's remarks apply to all Colonial gas undertakings) deserve what they are now reaping. With the enthusiastic outburst from old rutted methods and customs, the gas suppliers are finding great difficulty in convincing the inhabitants of the efficiency and economy of incandescent gas lighting. But what else can they expect? There was difficulty enough in this country a dozen years or so ago in fighting to success for a general appreciation of the incandescent light; and it is easy to imagine how much greater must the difficulty be with a community who, neglected by the gas people, have been well looked after and trained by the electricians. But it is clear that Mr. Quicke's vigorous methods are telling at Perth. Not only has he brought about the conversion of street gas-lamps to the incandescent system, but in four months the Company have fitted up 96 Lucas lamps, and the outlook is full of promise. Many a gas company over here would be happy if they could show a similar record in a like period. However great and deeply-rooted the prejudice, Mr. Quicke has apparently found the right way of dealing with it; and in face of such substantial testimony as he has now succeeded in placing before the public, their prejudice must soon wither. The portions of his brief communication in which he explains how he has converted and improved the street-lamps in Perth for incandescent gas lighting, and the disappointing experiences he has had with mantles are not the least interesting.

The Treatment of Corporation Officials.

Our sympathies are with Mr. F. L. Ramsden, the Manager of the Burton-on-Trent Gas-Works, in the quite unmerited treatment which has just been accorded to him by his Town Council. Up till now, Mr. Ramsden has been receiving £500 a year, with house, &c., for managing the gas-works, and £50 for managing the electric light works. It having, however, been considered necessary to appoint an Electrical Engineer to look after the latter department, Mr. Ramsden will no longer have to perform this work; but the Committee very fairly considered that he should not be the loser by the change, and that his salary as Gas Manager should be increased by the £50 which would be lost to him on the electric lighting branch being taken out of his hands. For some reason or other, this suggestion encountered strong opposition from the Council; and, in spite of an eloquent appeal by the Chairman of the Committee, who pointed out the great value of Mr. Ramsden's services to the town, the proposition was negatived. Surely this is not the proper way to treat an admittedly valuable servant. It is Mr. Ramsden's time the Corporation pay for; and if he faithfully devotes this to his work, he cannot do more—whether he has one department in his charge or six. He may possibly under the altered conditions of management be able to give more attention to the gas-works than has hitherto been the case; but in this event the Gas Committee will gain, while Mr. Ramsden loses substantially. Of course, there was the usual talk about it being possible to get a man to do the work for half the money—as if cheapness was the one thing to be considered!—and other remarks of a like kind. So far as Mr. Ramsden is concerned, the matter is a personal one; but we cannot refrain from entering another protest against the too frequent tendency on the part of local authorities to treat their servants in a manner which—to say the least—falls a good deal short of what they deserve. Instances of the kind to which we now call attention are not calculated to increase the popularity of employment under municipalities.

Nervous Gas Proprietors

From time to time we receive communications which indicate that the writers, as holders of shares in gas undertakings, have taken alarm at the "comparisons of cost" which our electrical friends disseminate so industriously. It is true that the figures quoted have frequently a very startling appearance; but that is only before they are carefully inquired into or practically tested. On countless occasions has the "JOURNAL" pointed out the flimsy basis upon which these estimates too often rest, besides publishing numberless refutations by engineers throughout the country of claims put forward by local electricity suppliers. One of the latest of these was a series of calculations made by Mr. R. G. Shadbolt, of Grantham, by means of which he proved that electricity at 5d. per unit, consumed in an incandescent lamp, was equal to his Company's gas, burnt in a flat-flame burner, at 5s. 5d. per 1000 cubic feet. This is figured out from the electricians' own statement that a unit of electricity is equal to 240 candles for one hour. Mr. Shadbolt's calculations have evidently not received the attention they deserve, judging by a paragraph which appeared last week in the "Glasgow Herald." In this, the writer states that "a little over one-halfpenny, or, to be exact, six-tenths of a penny, is about the total cost per Board of Trade unit for generating and distributing electricity in large works, where there is not only a great but a fairly steady demand." After giving expression to his gratification at the fact that there are five stations in England for the public supply of electricity for lighting, &c., where the total cost is under a penny per unit, and six more where it is less than one and one-tenth of a penny, the author indulges in the following declaration: "Approximately the

highest of these costs is equal to producing illuminating gas at about 1s. 1d. per 1000 cubic feet." In the first place, we would ask the writer whether he has included in his cost per unit of electricity any allowance for interest, sinking fund, depreciation, and other charges? If not, the figures must be misleading to those who do not know what a substantial sum should be added for these purposes. Then, again, why compare the best results of electricity with the poorest obtainable from gas? It may be that 15-candle gas, consumed in a flat-flame burner, would be about equal, if sold at 1s. 1d. per 1000 cubic feet, to electricity sold for lighting purposes at 1·10d. per unit (if such a price were possible); but those who desire to get the fullest available duty out of their gas do not now use flat-flame burners. Suppose an incandescent burner giving (say) six times as much light were employed, electricity at 1d. per unit would, on the basis named, be equal to gas at something over 5s. per 1000 cubic feet. Which is quite a different story. It would, of course, be idle to deny that, as far as lighting is concerned, gas has now a strong competitor; but it will be very long—if, indeed, such a time ever arrives—before electricity is able to fairly base its claim to consideration upon the fact that it is cheaper than the older illuminant.

And Some Reassuring Facts.

But while electricity is doubtless in many places making some inroads into the lighting business of gas undertakings, the latter are in other directions enormously strengthening their position. The perusal of the "Communicated Article" which we publish to-day from the pen of Mr. E. A. Harman, should go far to reassure those holders of gas shares who may be inclined to view with alarm the present market price of their holdings. Mr. Harman points out how the increased use of incandescent burners, gas cookers and engines, and electricity has tended to equalize the gas consumption during the summer and winter periods, thus largely reducing the capital expenditure necessary for a stated annual output. The value of this to the industry cannot well be over-estimated; and the untiring efforts made by gas managers to increase their summer consumption, proves that the fact has been realized in many quarters. Mr. Harman quotes some interesting figures as to the ratio of the maximum daily and weekly output to the annual output at Huddersfield in 1892 and 1902. Taking either figure, a largely reduced maximum manufacturing capacity is shown to be necessary now as compared with ten years ago. Emphasis is laid on the need for considering this altered condition of affairs in making calculations for extensions of works; and the article concludes with two suggestions which are deserving of the careful consideration of our readers. The first of these is that in valuations for the purchase of gas-works the ratio of the maximum daily and weekly output to the annual output should be provided for; and the second that one common basis should be adopted when comparing the capital per ton of coal carbonized at different works. With regard to the latter matter, Mr. Harman points out that any element of error would be avoided if the capital per 1000 cubic feet of gas per ton was taken as the basis for comparison.

A Pleasant Surprise at Bradford.

The statement of the working of the Bradford Corporation Gas Department for the year ending March 31, which was submitted by the Chairman of the Gas Committee at the meeting of the City Council last Tuesday, revealed a state of prosperity altogether beyond what was twelve months ago anticipated would be the case. Instead of the very considerable loss which it was estimated would be sustained on the year's trading, a net profit of £5123 has been realized. This result, the Chairman remarked, was due to careful management and better prices having been obtained for some of the residuals. The latter is, of course, a matter which is mainly, if not altogether, beyond the control of the Committee; but for the former, credit is directly due to the Corporation's able Gas Engineer (Mr. Charles Wood), whose labours for the good of the undertaking have, we are pleased to see, been rewarded by a very substantial addition to his salary. The net profit mentioned cannot off-hand be called a large one; but in judging the full value of what has been accomplished, there are many things that have to be taken into account. For instance, the amount handed over by the Finance Committee towards the cost of public lighting (£17,850) was more than absorbed by the reduction of 3d. per 1000 cubic feet which was made in the price of gas. Then the contribution of the Finance Committee, though representing a great step in the right direction, still left the Gas Committee a big difference to make up—the total cost of public lighting during the year having amounted to £30,562. The Chairman of the Gas Committee stated that, if the Finance Committee would grant an additional sum towards defraying the cost of the public lighting, a corresponding reduction should be made in the price of gas; and as the Chairman of the Finance Committee some time ago more than hinted that such a reduction would induce his Committee to increase their contribution, there is a cheerful outlook for the consumers. They, at any rate, will not be inclined to agree that it is "all the same" whether the public lighting is provided free by the Gas Department or is paid for out of the rates. A feature of interest in the accounts of the Corporation is the rapid increase in the sales of gas that is taking place in the districts which Bradford has recently been so busy in adding to its area of supply. In North Bierley, for example, where the Corporation have "been in possession" for three years, they have, after paying sinking fund and interest, and allowing for the benefit to consumers in the reduced price of gas, got well on the way towards making both ends meet; and it is confidently anticipated that next year a clear net profit will be shown. In view of the reduced price of gas, there is no reason whatever to suppose that the other added districts will lag behind North Bierley in the matter of increased consumption, so that the prospects for the combined undertaking must be admitted to be promising. It may be that, as the Chairman claims, the past year was one of the most satisfactory in the history of the Bradford Gas Department; but, notwithstanding this, there is every likelihood that the results now chronicled will be exceeded in the future.

WATER AFFAIRS.

The June Floods and London Water.

THE report recently made to the Registrar-General by Dr. T. E. Thorpe, the chief of the Government Laboratory, on the results of his chemical analysis and physical examination of the water supplied to the Metropolis last month, is of unusual length and of exceptional interest. As a rule, Dr. Thorpe's reports, which appear month by month in the weekly return of births and deaths issued by the above-named official, are very much of a stereotyped character. But the extraordinary meteorological conditions of June played such havoc with the water supply, that some more extended observations than usual were called for. Considering the deluge with which the Thames Valley was visited in the week ending the 20th ult., following upon the wet weather of the previous month, it is not surprising that volumes of land water found their way into the river, and detrimentally affected it. On the 23rd of June, the water as drawn from the mains of the Southwark and Vauxhall, Grand Junction, and Lambeth Companies was found by Dr. Thorpe to be of "very unsatisfactory quality," owing to its deep brown colour and the excessive amount of organic impurity it contained. By far the worst of the three waters was that of the first-named Company, as it contained more organic matter than had been observed in a filtered London water since 1869. At the same time, it was mainly of a vegetable character, as shown by the high ratio of carbon to nitrogen (13·4 : 1); and the agency to which its presence was attributable—the extraordinary rain—brought down the chlorine from 1·7 to 1·25 parts per 100,000. Dr. Thorpe acknowledges that the quality of all the Thames waters was good until about the middle of June. That of the Southwark and Vauxhall Company was the first to give way; and from the 19th to the end of the month he says that it was "bad," while the water of the two other Companies named above was "unsatisfactory."

It is useless to close one's eyes to the fact that the forces of Nature were too powerful for the existing mechanical appliances for dealing with the water from the Thames, coming as it then did in such unusual bulk. Indeed, Dr. Thorpe declares that the storage arrangements of certain of the Companies were inadequate to cope with the condition of things prevailing during the heavy rains of June, and that consequently flood water had to be passed direct to the filters.

This condition, however, was altogether exceptional, and might not occur again for many years. Meanwhile, every month will bring nearer to its completion the great reservoir the Company most seriously affected are constructing at Walton, which will contain about 1000 million gallons of water. It is much to be regretted, as Dr. Thorpe points out, that the June floods followed so soon after those of May; for during the latter month the quality of the Company's water was the best of the Thames supplies. That they were unable to maintain this high standard was due to insuperable difficulties; and it seems to us that if these had been fairly considered, much of the language which has lately been used towards the Company would not have been employed.

The Work of the Thames Conservancy Last Year.

In view of the large extent to which the Thames is drawn upon for the supply of water to London, it may not be out of place, in connection with the subject dealt with in the preceding paragraphs, to glance at the work done by the Conservators of the river in the past year, especially in the upper reaches (with which we are more immediately concerned), as revealed in their report issued last week. In the first place, the whole of the watershed above the Metropolis was kept under careful supervision by the staff of inspecting officers in the service of the Conservancy Board; and pollution was diverted from the tributary streams at seventeen towns and villages, representing a population of nearly 30,000. Considerable work was done in the inspection of outlying premises, including farms, isolated residences, and manufactories, with the result that pollution was diverted in 216 cases. Unfortunately, the Conservators are rather hampered in their efforts to prevent the inflow of trade refuse into the tributaries, as their authority for dealing with discharges of this character only extends for a distance of three miles from the river. They consider this limit should be abolished, and that their general powers for the prevention of the pollution of the Thames above the Metropolis should operate over the whole of the watershed. There can be no doubt that such an extension would be attended by beneficial results. Much as we believe in the self-purification of streams, we would rather entirely exclude from them objectionable elements, than trust to water carriage to render these harmless. Owing to deficient rainfall, the total flow of the river last year was below the average; but during the summer months it was greater than in the corresponding period of 1901. It may be confidently expected that the average will be exceeded this year. The report bears evidence that the Conservators do their utmost to provide the London Water Companies with a satisfactory supply; and it likewise shows that they receive in return substantial contributions to their funds from these bodies—£2450 having been paid by the Companies last year in respect of the lower, and something like £27,000 on account of the upper section of the river, in which their intakes are situated.

At the recent annual meeting of the Incorporated Association of Municipal and County Engineers, the President (Mr. W. Weaver, the Borough Engineer and Surveyor of Kensington), adverting to the changes which the Metropolis has undergone in the last half-century, dealt *seriatim* with such questions as water supply, locomotion, roads, refuse removal, sanitation, and lighting. With regard to water supply, he remarked that the plan of abstracting from the river the water likely to overflow and cause damage, and storing it to meet times of drought, fully met present necessities; and the enormous reservoirs and filter-beds between Staines and Hampton, and the recent extensions of the New River and East London Companies, would probably satisfy the requirements of London during the next forty years.

In a recent number of the "Comptes Rendus," M. J. L. Breton dealt, in considerable fulness, with the comparative merits of lead and zinc paints. According to him, white lead paint resists better than paints of zinc oxide or lithopone the action of certain strong acids, and the penetration of efflorescences of saltpetre; but it is inferior to them in resisting heat, sudden variations of temperature, hydrogen sulphide, and energetic oxidizing agents. White lead paints adhere less firmly, and show a greater tendency to blister than zinc oxide or lithopone paints. The mixture of white lead with linseed oil is less nearly homogeneous than the mixture of the same oil with zinc oxide. For equal weights, the covering powers of white lead, lithopone, and zinc oxide are approximately represented by the figures 3, 4, 6, respectively. For these reasons, as well as from sanitary considerations, the substitution of zinc paints for lead paints is recommended.

ESSAYS AND REVIEWS.

THE FIGHT FOR THE GAS INDUSTRY FOR A CONTROLLING HAND OVER MONAZITE.

Mr. J. Tysoe's Mission to Brazil.

It has been a task of extraordinary difficulty to wake up the British gas industry to a sense of the importance to it of the monazite sand and thorium question; and the task remains unaccomplished save in one comparatively small circle. Now it may be submitted as an axiom that as coal is to gas making so is thorium to the making of incandescent mantles; and those who have stubbornly refused to take any interest in the published statements as to thorium during the past few months may be asked to muse over that, and see what it means to the gas industry. Supposing it were possible, can anyone imagine what would happen if the whole of the main sources of gas coal fell into one man's hands; and he supplied a combination of four or five dealers, and those dealers only? Now something worse than that happened recently in connection with the supply of thorium to European countries; and it has only, by the narrowest space of time, been prevented from arriving at a state of perpetuation by the intervention of one man, with the concurrence of his colleagues. If half what has occurred in connection with thorium had occurred in connection with coal, the official heads of the gas industry would have united in one loud emphatic protest; and yet the major number have been unmoved as to the future of the former. It is surely unnecessary to-day to ask, to drive the matter home, what is the relation of the incandescent mantle to the gas industry? The answer is found in what it has done, is doing, and will do for the industry. Every gas official occupying a managerial or any other position knows how deeply the present fortune of his own undertaking is due to, and its prospects are dependent on, the incandescent mantle, the very existence of which—mark this!—hangs on one substance, and that thorium. Yet so long as mantles could be bought with readiness and fairly cheaply, so long has there been nothing, generally speaking, but phlegmatic contentment; and what has been written on the subject of the staple element in the manufacture of the mantles—of the supply being in the hands of a combined few in a foreign country, with no representation of, or controlling power for, the gas industry of this or any other country, of the growing shortage of the immediate supply through a rupture of the agreement under which monazite sand (from which the thorium is obtained) was removed from the shores of Brazil, and of the increase in the price of thorium (from 26 marks or less per kilo.) to the point of 45 marks, and a prediction that 70 marks would be reached before long—has not ruffled the serenity that pervaded the industry as to what the morrow might have in store regarding this great vital factor in the industry's prosperity.

The monitions on the subject have up to the present raised but little interest. But consider what is here written, and add to it all that is left unsaid owing to the time and space that would necessarily have to be consumed in putting the situation in a stronger and clearer light. After each reader has given to the subject that serious consideration which we have craved for it previously and again now, two questions may be put with confidence: First, Is it right that the future control of thorium should be allowed to remain in not more than half-a-dozen hands without some strong endeavour being made on behalf of the gas industry to get some amount of governing power? Secondly, Is it right that this large mantle-consuming country should be under the thumbs of less than half-a-dozen thorium manufacturers in another country, whose will in the matter of the price at which they would dispose in the future of the principal ingredient of the lighting fluid of mantles might have an injurious influence on the progress of the adoption of incandescent lighting? We have long since come to the conclusion that it is not in the best interests of the gas industry such conditions should be allowed to continue a day longer than can be helped; and earnest deliberation will, we feel sure, bring from all quarters a liberal endorsement.

But while the question has been treated with general indifference and passiveness, the whole of the administrative authorities of the gas industry must, before this story is ended, admit the infinity of the indebtedness to Sir George Livesey under which they have once more been placed by his perception of the importance of this question to the future of incandescent lighting in this country, and, having perceived, by the immediate and active steps which he took in the exigent circumstances to realize for the British gas industry some controlling power in the future of the chief source of thorium. It was a natural appendix to his work in securing the cheapening of mantles, that Sir George should make this move, when the cheap mantle was threatened, to ensure that the low price should be maintained; but that he should have been left to make the move alone does not show a particularly careful watchfulness on the part of the gas industry over the welfare of the mantle that has brought to it new life. Up to the present, we have honourably abided by Sir George's request that there should be no reference made in the "Journal" to his action in this

matter—at all events during the progress of events and negotiation. Now, however, it may be claimed that—the first part of his vigorous, diplomatic intervention on behalf of the British gas industry having been successful first in preventing the sealing and signing of a contract that would have committed the sources of monazite sand to the hands of a limited few abroad, and secondly in opening the contract to tender—we are relieved from our bond of secrecy. While active work was proceeding in the matter, the less that was known about it outside the better, in view of the many vigilant agents of the parties who stood to lose such a lucrative monopoly (or practically so) by the appearance in the field of a powerful competitor. That time has, under existing circumstances, passed.

Even now, there is not much to tell; but that is no measure of the importance of the steps taken and the achievement to this point. It must be stated to their honour that it was Professor Vivian B. Lewes and Mr. Emil A. F. Schultz of the Guaranty Incandescent Mantle Company, Limited, who separately, some five months or so since, first approached Sir George Livesey in this matter, and represented to him that something ought to be done, and that the time was opportune, to prevent the continuation of the monopoly in monazite sand and thorium, which monopoly bid fair to become oppressive to the gas industry in England. Immediate consideration had to be given to the means and manner by and in which action could best be taken, as information had been received that a new concession was about to be granted in Brazil for the monazite sand. There was no time to be lost. Communication was at once opened, through one of the Government departments at home, with His Majesty's representatives in Brazil; and then it was decided by the Board of the South Metropolitan Company, at the instance of Sir George, to at once send out to Brazil an emissary with plenary powers to, if possible, enter into a contract, or take such other steps as were necessary to secure a share in one, on behalf of the Company for the benefit of the British gas industry. The difficulty was, in the first place, to find the right man for such a mission. It required a man with a combination of talents—a man discreet, diplomatic, discriminative, with business aptitude, and moreover with a knowledge of Portuguese. This last condition was, as events proved, indispensable; and where was such a man to be found quickly? Hands might have been laid on several possessing all the first good qualities, but without the knowledge of the language of the people with whom he would have to deal. Not at first was it remembered, but fortunately it was later, that the very man needed for such a delicate task was an officer of the Company. Twenty-five years ago, Mr. J. Tysoe, the Engineer of the East Greenwich Gas-Works, was the Assistant Engineer to the Bahia Gas Company; and in the three-and-a-half years that he spent in Bahia, he learnt a great deal about the people and their language. Never did unusual early experience come in more appropriately. No sooner were these facts recollected, than Sir George Livesey communicated with Mr. Tysoe, who readily responded to the call to discharge a duty for which he was so specially qualified. The arrangements were speedily made, and on April 2 Mr. Tysoe sailed from Liverpool. He embarked on his mission with the good wishes of all who knew of it; and he had at his back, the power of the South Metropolitan Gas Company, and what is more—and this shows the very generous and real manner in which the Chairman and Directors of the Company went to work over this matter—with sufficient money (an amount measured in thousands of pounds) at his disposal to secure the concession if it could possibly be obtained.

On his arrival in Rio de Janeiro, Mr. Tysoe found that a contract was ready for signature with Messrs. Schnitzspahn and Co. for the exploitation of the monazite sand. Had he been but a little later, the contract might have been signed and sealed; and the monazite sand would have continued the monopoly which clever people have contrived to make it during the past twelve months, with the present result in respect of the price of thorium to which reference has already been made. Mr. Tysoe succeeded—by his presence, and proofs of his authority and capability to act on behalf of the gas industry in England through the South Metropolitan Company—in stopping the completion of the document. His time was subsequently well taken up in interviews and other matters connected with the contract; and a good thing it was that he had command of the language, for a man without that command might have committed the Company in a manner which would not have been altogether pleasant. Although the first fortunate result of the mission was the stopping of the proposed, and almost consummated, contract with Schnitzspahn, the Brazilian Government could not enter into another contract immediately, even though a higher price was offered, as by law they are compelled, in the event of competitors being in the field, to advertise for tenders for three months. That is the present position. Tenders have been advertised for, and now we have to patiently await the result.

Mr. Tysoe reached home again yesterday week; and Sir George Livesey has since personally informed the writer that there is reason for being much happier now over the matter than before Mr. Tysoe started on his journey, in the fact that the fear as to a monopoly in thorium is now farther off, while before then its perpetuation (until new sources of monazite sand were discovered) was imminent, and that there is now less likelihood of the British incandescent mantle trade being cornered by any thorium ring. The fight is not yet over; but, beyond what is here stated, we are not permitted to speak at present. We may, however, say that, while Sir George Livesey is the active spirit in the prosecution of this matter to its end—whatever that end may be—he has now secured the adherence of a few influential supporters who are largely interested in the matter either as users or makers of mantles. This emphasizes the point which has been previously referred to, and which Sir George would, we are sure, wish to be widely known. It is that there was no intention on the part of the South Metropolitan Company that their forced exclusive action in the first instance should be exclusive in any way in any benefits which might accrue from it. The action—though expense, work, and anxiety in connection with it were willingly undertaken by the Company—was absolutely for the advantage of the gas industry. With all deference to the prime mover, we are not disposed to keep concealed any longer the knowledge as to what has happened. It has been a good piece of work, taken in hand and followed up with characteristic energy; and this recognition must be made of the prominent part that Sir George Livesey and Mr. Tysoe have taken in it. It was not the fault of Mr. Tysoe that he could not come back with the contract in his pocket; that was the fault of the law of the land. But he succeeded in bringing about the next best thing, and that was opening up the monazite sand to free competition, in which competition this country now stands as good a chance of winning a share as any other.

It is difficult to give full and adequate expression to our estimate of the value of Mr. Tysoe's services in this matter. As already shown, there are not many men who possess as he does the whole of the qualifications needed for such a mission in Brazil, and withal such an impression, as only a gas man can have, of the importance of the result for the industry which he serves. Moreover, it is not every man, even in the interests of the industry to which he is devoted, who would have cared, at only a few days' notice, to leave home, wife, and family, and also his works (in which important extensions were in progress to which he had been giving daily attention), to alone undertake a journey of nearly 6000 miles to Southern Brazil, enter upon a task about which he had little information as to the exact position, and about the possible issue of which he knew nothing, and then, after all, perhaps have to face the same long journey homewards with no honour attaching to the enterprise other than that of the consciousness of having done his best. But Mr. Tysoe faced the call boldly and willingly, and glad indeed—even though his personal interest in the matter was nothing more than that of any other individual in the gas industry—to have such an opportunity of exercising his ability in an endeavour which, if successful, would work inestimable good for the industry. Success to the utmost degree that any man could have carried it under the circumstances did, as indicated above, attend his labours. This success, the journey, and the self-disinterestedness that marks it, whatever the ultimate issue may be, will combined stand as one of the prominent events in Mr. Tysoe's professional career. The least that can be done is to show how much this vigorous action on the part of Sir George Livesey and Mr. Tysoe is appreciated in the industry. If the outcome is not the one desired, it will not be through lack of earnestness in the effort.

North British Association of Gas Managers.—The 42nd annual meeting of this Association will be held at Ayr, on the 30th and 31st inst., under the presidency of Mr. Thomas Lighbody, of Renfrew. According to the programme issued by the Secretary (Mr. R. S. Carlow), the business will be transacted in the Council Chamber, the technical portion consisting, in addition to the Inaugural Address, of four papers. Mr. William Young, of Peebles, will offer some remarks upon "The Principles Involved in the Production of Gases from Coal, and Suggestions as to their Application in Future Developments;" Mr. Alexander Waddell, of Dunfermline, will describe the coal and coke handling plant at his works; Mr. George Keillor, jun., of Peterhead, will deal with the manufacture of sulphate of ammonia; and Mr. P. B. Watson will relate his experiences at the Stranraer Gas-Works. At the close of the business, the members and their lady friends will dine together at the King's Arms Hotel; and the next day will be devoted to an excursion by steamer to Arrochar.

The Storage of Petroleum Spirit.—At the opening meeting of the International Congress on Fire Prevention, Dr. Dvorkovitz (the Principal of the Petroleum Institute) read a long paper on "The Necessary Safeguards for the Prevention and Spread of Fires in Petroleum Stores." In the course of it, he stated that petroleum spirit could be stored with safety in tanks above ground; but the following conditions should be introduced and strictly adhered to: The tank should be an air-tight one, with four ventilating pipes in the sides near the top, and also one in the centre. The outside of the pipes should be covered with wire gauze, and in the summer time the roofs of such tanks should be covered with white fireproof tarpaulin, and should be watered every day by means of a spray. This would be a very cheap, and at the same time a very effective, arrangement, and would not only prevent the possibility of a fire, but would also be a protection against too large an evaporation, which generally occurred in storage tanks. Another precaution was to have the tanks surrounded by a wall.

THE WAY OF IMPROVEMENT IN COAL CARBONIZATION.

It is far from being a mere coincidence, that at the present time the attention of gas engineers should be divided between proposed alterations of coal carbonizing systems, and the expediency of modifying the character of the gas supplied to the consumers. There is indeed a very real and close connection between the two branches of technical inquiry which hardly requires to be explained in detail, so obvious is it to the expert observer. For the benefit of such observers of contemporary developments of the industry as cannot claim a competent knowledge of its needs and possibilities from the inside, however, it may be as well to premise that the practical problems of gas manufacture have been recast, from the form which they retained up to the close of the past century, by the disappearance of the factor of "sperm value," or "candle-feet," from all modern endeavour to make the best use, from the gas manufacturer's point of view, of a ton of coal. Consequent upon this elimination of a quantity which formerly held a place of commanding importance, all the technical handbooks extant are to a corresponding extent out of date. None of them contains a statement of the actual requirements of the gas manufacturer, as these are now understood; though, of course, they preserve for the instruction and guidance of those who enjoy independent recognition of these requirements, much valuable information which is capable of being put to use in the ascertainment of truths that were not in the minds of their authors.

Whatever may be the statutory definition of the ordinary gas supply of the future, in the United Kingdom or any part of the world, the fact will still remain that the bulk of it will be the product of the carbonization, or distillation, of bituminous coal. It is necessary to bear this in mind, to account for, and help towards the due appreciation of, the enormous importance attaching to carbonizing methods and appliances. Apart from all other considerations, the large preponderance in quantity of bituminous coal deposits over every other kind of coal from which it is commercially practicable to make illuminating gas for general distribution, is enough to assure one of the justice of this conclusion. Fortunately so; for although the disappearance from the fuel market of anthracite coal would be a great loss to the community in many respects, it is still one that can be contemplated with a certain amount of calmness and confidence that work would not necessarily cease in consequence, or the industrial population suffer wholesale deportation. But the case is otherwise with bituminous coal and its products, gas and coke—to which might be added, as proved necessaries of civilization, tar, pitch, and ammonia. What material civilization would do without all these products, or any of them, is not to be conceived. The most forcible writer alive would fail to impress the world of readers with any adequate sense of their daily and hourly indebtedness, not merely to bituminous coal, which is a fact that is taken as a matter of course, but to such humble servants of the commonweal as coke, tar, pitch, and ammonia. This is one of the every-day miracles that escape recognition because the results are always spread out under our eyes. The power of apprehension of the human mind is limited, even in respect to the operations of its like; and the foundations of modern industry are as completely hidden from the casual eye as the sources of cosmical energy and the springs of life.

For all which it is possible to say that the carbonization of bituminous coal must go on indefinitely; and this is sufficient reason, and more, for all the attention that is actually being directed to the operation. So far as the gas industry is concerned, the whole scheme of coal distillation is up for revision in the light of the new condition of successful performance already indicated. Every form and step of the process of carbonization is being gone through again, as from the beginning of the industry; and it is therefore not to be wondered at that some ancient methods are being tried afresh amid new circumstances and to novel purposes. This, indeed, is the best possible way of progress. The germs of everything that is new on the earth are in the past, and the causes which directed them either into the surviving shapes, or brought about their cessation, were not necessarily such as prevail at present. Many successful manufactures of the day have an antiquity which can be fruitfully explored in search of the reasons why they did not succeed before. Therefore, one welcomes the large retort-oven, and the vertical retort, and every device proposed for operating these and other carbonizing methods, as positive progress, even though they appear to throw-back to a remote ancestry. The new world is the old, after all; and the oldest things are the latest. Date is of less account than circumstance in the history of invention. And if it is found that an almost forgotten idea really and truly deserved its degree of oblivion, there is so much gained for the cause of progress on other lines.

For long years the hands of coal carbonizers for gas making chiefly were tied, and their minds obsessed, by the "sperm value" condition of successful working. A striking illustration of this effect is furnished by a passage occurring in Mr. Charles Hunt's "Gas Lighting," forming the third volume of Groves and Thorp's "Chemical Technology," published in 1900. On p. 21 of this book there appears a foot-note which runs as follows: "Upon further increase in the temperature of carbonization, a decrease in the value of the gas made per ton occurs." This remark refers to experiments of great interest and value, the results of which are detailed and can be studied with advantage. They show that by raising the temperature of carbonization from 1400° Fahr. to 1835° Fahr., the yield of gas per ton from a particular coal was increased from 9955 cubic feet to 14,149 cubic feet, while the illuminating power dropped from 18·36 to 14·28 candles. Without going for the present into the conditions and circumstances of this experimental research, it will suffice to remark that the statement that the value of the gas was diminished is based solely on the reduction of the calculated number of "candles per ton" from a maximum of 42,969 in the case of a medium quality and yield (17·8 candles and 12,077 cubic feet per ton), as compared with 40,409 candles per ton with the highest recorded yield and the lowest illuminating power. The difference is not great; and it does not look of such cardinal importance now as it did when the experiment was made, probably ten years ago, even granting that the photometrical test was equally fair to all the qualities of gas made. The problem of the day is to get, on the works scale, this 14,000 cubic feet per ton of 14¼-candle gas which Mr. Hunt obtained under other conditions. When this has been accomplished, it will then be time to try for something better. The significant consideration here is, that ten years ago, or thereabouts, this careful gas engineer conceived himself to have been working on the wrong tack, merely when he saw his "sperm value" on the decrease. The placard of "No Thoroughfare," which he perceived plainly enough at this juncture, has now been removed. A whole treatise on modern views of gas manufacture could say no more than this as regards the new horizon opened before the engineer by the accomplished facts of the fresh applications of gas by the consumer.

Meanwhile, all the new systems of carbonization and retort working which are put forward from time to time can be judged by the foregoing standard. It is helpful to reflect that the coke-oven style of gas production, over which so much noise was made a year or two ago, has ceased to interest gas makers. It is a saddening reflection—not calculated to heighten the practical person's esteem for the statements of the man with a diploma—that at the very period when Dr. Schniewind was making such play with his papers on the Everett plant, this interesting property was even then being prepared for passing into the Receiver's hands. A gas plant which does not make money does not make anything for long. The temporary reputation achieved by Dr. Schniewind's unquestionably clever statements is an impressive illustration of the difficulty of dealing with industrial processes by the method of "papers." No help in respect of the industrial treatment of bituminous gas coal has hitherto come to us from America.

As regards the newest proposals for the improvement of carbonizing methods and appliances which have been described in the "Journal," it is too soon to say anything critical. Nobody who has ever attempted to improve upon gas-retort settings and their accessories needs reminding that to such efforts there is no speedy end, if they are found to be at all worth following up. One may begin with what looks like a very innocent alteration, only to learn that every departure from routine involves something else that has to be worked out. Therefore, no designer of a new retort or a novel stoking-machine need be in a hurry to publish results. If he does, he must look to be told that people will listen to him if after another three years he tells the same tale. This only may be remarked, for the present—that, in all the latest carbonizing improvements that have yet put in their claim for the favour of gas manufacturers, the discharging of the coke is the weakest part. Retort charging, that is to say, has outstripped the necessary consequential operation, both in speed and ease of performance. It must always have been so, from Murdoch's time. It is easy enough to get the coal in; but to get the coke out is another business altogether. The method of pushing is in favour again for the moment; but whether it will supersede drawing the charge is for the present doubtful. Of course, the example for successful coke pushing is the retort coke-oven; but the conditions of this proceeding are very different from anything to be found in ordinary gas-retort working. The large bulk and great weight of the retort coke mass favour its being slowly and irresistibly pushed out of its native cavern. Such masses differ in every significant respect from gas coke. They are always perfectly hard and worked off, or they would be left in to finish. They bear by only one relatively narrow edge upon the sole of the oven, where the sliding has to take place under a heavy incumbent weight which forbids riding. There is plenty of time for the work, which only comes once in 24 hours, or at a longer interval.

Compare this with the lightness and friability of gas coke resting in a shallow layer, with usually plenty of room for the lumps to ride and pack. The soft coke near the mouthpieces plays a part in the movements of such a charge, by pushing from one end, which has no parallel in the coke-oven. And then, of course, directly it is understood to be necessary to pick and prepare the coke for pushing, the workman may as well draw the whole charge while he is about it. A man who must be on hand costs as much as one who is working. "They also serve, who only stand and wait," says the poet, truly; and they are paid accordingly. Many an inventor has been misled into thinking that his arrangements saved labour, when they only spared the

labourer. The distinction is of vital importance. Speaking roughly and generally, it does not much matter to the employer whether the men he has to keep work hard or only stand by. One suspects there would be a good deal of standing by in regard to certain of these carbonizing devices, for coke will not always fall out of a vertical tube when the bottom is taken away. And as to mechanical pushing—if one or two retorts in a setting jam, the beauty of the whole performance is totally destroyed; for a relief gang is a poor sort of accessory to a labour-saving machine. Yet the recommendations of pushing out the coke are amply sufficient to warrant every possible endeavour to succeed in this way of working; and perseverance and ingenuity may always triumph over difficulties, when the conditions can be varied. The latter is a potent consideration. It is useless, after adequate trial, to keep hammering away at the same thing. If a change of conditions or dispositions can be effected, every renewed attempt is practically a fresh start; and this way success is to be found, if at all.

ELECTRIC LIGHTING MEMORANDA.

The Municipal Electrical Association—A Glozing Address—Weakness of Municipal Bookkeeping—The Period for Municipal Loans.

THE eighth annual "Convention" of the Incorporated Municipal Electrical Association was held at Sunderland last week, under the presidency of Mr. J. F. C. Snell, the Electrical Engineer to the Sunderland Corporation. The name given to these meetings smacks pleasantly of the American language, and was probably chosen in order to signalize the difference that distinguishes the gatherings of this Association from those of exclusively technical societies. It is understood, in fact, that the Association embraces within its ranks municipal magnates as well as the paid officials of local authorities having electricity supply undertakings. The technical members do not aim at getting together to "talk shop" among themselves, as other professionals do; but they love to exchange sweet counsel with worshipful mayors and honourable councillors, admitted to these meetings on an equal footing with themselves. It is an idyllic picture, but not, somehow, convincing. In welcoming the Association to Sunderland, the Mayor (Mr. Councillor Turnbull) justly remarked that "taking the average composition of Town Councils, it could hardly be expected to find in their ranks any skilled electricians." This being the notorious fact, it is a little difficult to appreciate the amount of benefit these municipal gentlemen can expect to derive from rubbing shoulders with professional electricians. Perhaps, however, the latter wish to prove that there is nothing shocking in such contact.

The suspicion arises, in this connection, that the formal proceedings of the Association are likely to be aimed at the municipal magnates rather than at the technical portion of the company. This appears to have been the case with the President's address, which was a long apology for municipal trading in electricity, calculated to solace those who are not too curious about looking beneath the surface of smooth things. Mr. Snell's only fault was that he rather overdid it. The "Newcastle Daily Chronicle" remarks that the figures advanced "were to the same end that conferences of religious and philanthropic bodies have in view when they boast the number of new adherents—to justify the propaganda, and to encourage the others." This is very severe, and goes to strengthen the suspicion that the combination of municipalism with electricity supply is not altogether a happy blend. Mr. Snell quoted figures showing that in London electric lighting companies "spent 19 per cent. more on plant, charged 32 per cent. more for each unit sold, and their costs were nearly 9 per cent. more than those of the local authorities." It is, according to him, the same with the provincial undertakings. "The companies spent 25 per cent. more on plant, charged 41 per cent. more per unit, and their costs were nearly 34 per cent. in excess of the costs of municipal undertakings." After this, who can doubt that the best people to carry on electricity supply are those amateurs who, as the Mayor of Sunderland acknowledged, know nothing about the business?

Unfortunately, this overweening boldness on the part of the President of the Association considerably overshoots the mark. At one time, as the "Newcastle Daily Chronicle" observes, the most daring claim that advocates of municipal manufacturing would advance, was that undertakings of the kind might be carried on as successfully under communal control as under private or joint-stock enterprise. It would have been very useful if the Association had been able to prove so much; but not even this instalment of certitude has been forthcoming. Any attempted comparison of the figures relating to the working of an electricity supply company and a municipal department engaged in the same enterprise, cannot be otherwise than misleading. The company undertaking is an entity, and its figures must relate to its own affairs and not to anything else. It is altogether different with a municipal departmental undertaking, which has connections with all sorts of other departments that render balance-sheets a matter of book-keeping. Municipal servants anxious to say pleasant things in their masters' ears may protest to their hearts' content; but, however extravagantly they may over-prove a case, the common sense of the community is awakening to the dangerous inflation of local indebtedness and the increase of local rates.

The gist of the foregoing criticism of the official pronouncements of the Association is borrowed, as is acknowledged, from the "Newcastle Daily Chronicle," in order to show that the "JOURNAL" is not alone in holding these municipal electricity supply pretensions in profound distrust. The very circumstance that the increase of municipal trading should have the consequence of throwing doubt upon the honesty of all municipal book-keeping, is enough to warn impartial burgesses, jealous for the honour of English corporations, of the existence of a danger which ought not to be incurred. Absolute rectitude and candour in municipal accounting is the first condition of any rehabilitation of municipal trading at the bar of public opinion; but how is this to be hoped for while, as an outspoken member told the Association, members of municipalities have "always the fear of November before them," and were apt to consider their own electoral interests before everything else? Another matter that vexes the souls of municipal traders is, of course, the unsolved problem of a proper provision for depreciation, and also the right basis of charging for the service rendered, whatever its nature. Most municipalities hanker after the sweet savour of "profits in relief of rates." But it is becoming pretty generally understood that there is little prospect of anything of the sort, if loans are to be paid off within the shortened periods now insisted upon by the Government, and if the most modest arrangements are made for reserve funds and depreciation. The President of the Association, to do him justice, had the courage to take up the position that local authorities must at some time make both ends meet in their trading accounts. In order to do this, it might be necessary to meet deficiencies from the local rates as they arise, or raise the charges. This is the Bermondsey clause, as amended. Naturally, Mr. Snell objected to short periods for the repayment of loans, as operating prejudicially to the development of municipal enterprises. But he is too late. The present experience of all those municipalities who are "converting" their tramways to electric traction, long before the capital outlay on the old horse lines could be wiped out, is a warning against the pledging of the future of localities for the sake of temporary advantage in the present, which is not likely to be neglected. Whether or not electrical plant is good for 42 years, the impossibility of forecasting what the future will bring forth in this respect is an insuperable reason for making the present pay for itself.

BYE-PRODUCTS OF THE BLAST-FURNACE.

IF in the article which has the honour of opening the current number of "Feilden's Magazine," Mr. Horace Allen does not make any important contribution to the published knowledge on the subject of "Blast-Furnace Bye-Products, and their Possible Recovery," he does the good service of giving us a birdseye view of the whole expanse of that knowledge. For this, he has to be thanked. Fifteen years ago, as he tells us, there was no idea that the principal product of the blast-furnace might possibly become, through the profitable recovery of the bye-products, a secondary consideration in regard to the means of returning a respectable dividend, though in one case at least, the profits obtainable from the recovery of certain bye-products has turned the scale, and saved the works from being abandoned. Mr. Allen classes as the bye-products the sensible and latent heat of the molten pig-iron and slag, the gases (the sensible and combustible heats), ammonia, tar, and oil. In what is written regarding the first classes, there is nothing at all in which we have anything more than an indirect interest; but in what the writer says about the gases and the subsequent named bye-products, something is found which touches nearer home.

The large volumes of gas that are evolved at the top of the furnace, in the smelting of iron by means of air-blast, is estimated to be about 160,000 cubic feet per ton of coal consumed, measured at atmospheric temperature and pressure; while the volume per ton of coke is about 170,000 cubic feet, measured under the same conditions. The chief constituent of the gas in either case is nitrogen, which has a proportion above one-half. The bulk of the gaseous mixture consists of inert gas; the remaining portion being chiefly carbonic oxide, with small proportions of hydrogen, marsh gas, &c. Now the gases on leaving the top of the furnace are in a more or less highly heated state, carrying off sensible heat equivalent to from 7 to 10 per cent. of the total heat value. It would, Mr. Allen writes, be almost, if not quite impossible to recover the whole of this heat, though, where the gases pass through brick flues or brick-lined tubes, a proportion of the sensible heat is retained by the gases and assists their combustion in the stoves and boilers, so that it must not all be considered waste. But the gas, if taken direct to the stoves and boilers without being subject to any process of purification carries with it a considerable proportion of water vapour, besides dust and a light fume. This dust has been the cause of considerable trouble which for a time impeded its larger utilization; but the author proceeds to explain how now, by the cleaning methods employed, the dust itself is available as a source of zinc recovery.

It has been stated that blast-furnace gas consists of a mixture of inert and combustible gases, so that besides the sensible heat carried away from the furnace by the bulk of the gas, the combustible heat constitutes a very much more valuable bye-product. Each cubic foot of gas is capable of giving out about 100 British thermal units on combustion. As coke is capable of developing, on complete combustion, 13,000 British thermal units per pound, 2240 × 13,000 = 29,120,000 British thermal units per ton. The gas evolved from the combustion of a ton of coke in the furnace being 170,000 cubic feet, this, at 100 British thermal units, equals 170,000 × 100 = 17,000,000 British thermal units, or 58 per cent. of the thermal value of the coke consumed. The earliest attempt, says Mr. Allen, to recover this valuable bye-product was its application in its more or less crude state to combustion for raising steam and heating the blast stoves. However, the methods adopted were far from perfect, as the efficiency was largely dependent upon the results to be obtained from chimney draught, associated as it is with constantly varying atmospheric conditions. As the dust carried along with the gas was not separated to any considerable extent, or the water vapour removed, the result could only reach a low efficiency. But the application of blast-furnace gas to develop power in gas-engines has been found a great advance in the effective recovery of the combustible heat; and this source of profitable application is (as readers of the "JOURNAL" have been made aware by numerous references) making rapid strides—more especially where the gas has been freed from dust and moisture in an effective manner.

Other bye-products become recoverable when raw coal is the fuel used, as for instance tar, ammonia, &c. Mr. R. Hamilton, in a paper read before the Iron and Steel Institute, estimates the yield of anhydrous tar, in Scotland in the year 1900, to be 112,000 tons. The recovery of tar, ammonia, and oil is now practised at nearly, if not quite, all the iron-works in Scotland; and the production in 1901 was on the average as follows:—

Sulphate of ammonia	22·67 lbs.	per ton of coal
Pitch	119·8 lbs.	,, ,,
Oil	7·3 gals.	,, ,,

The average market value of sulphate of ammonia is about £12 10s. per ton, so that 22·67 lbs. would be worth 2s. 6d. In Derbyshire, where a mixture of native coal is used with coke in the blast-furnaces, some of the gases are applied for driving gas-engines; and it is found that, with a 120-horse power gas-engine continually running, as much as 40 gallons of tar are recovered by the gas-cleaning plant per diem.

Besides the tar there are certain oils, as stated, which are recovered by the same apparatus as is employed for recovering the ammonia and tar. Even though the apparatus necessary for treating blast-furnace gas for recovering the bye-products, owing chiefly to the enormous volumes of gas to be dealt with, necessitates a considerable first cost, it is found, the author asserts, to be a source of considerable economy from a commercial point of view; and the gas, after passing through the process, is still available for application to recover its combustible heat.

In the concluding part of the article, Mr. Allen returns to the question of the use of the gas in engines; and he states the established fact that the treatment of the gas for this purpose should include the following: (1) Cooling; (2) coarse filtering; and (3) fine filtering and removal of the moisture. The removal of the fine impalpable fume is the most important, as the cooling is chiefly necessary to allow of the gas being propelled by means of fans through the cooling and filtering apparatus; and it stands to reason that, if the gas will carry and deposit fume, not only in the tubes of boilers, but even out of the top of high chimney stacks, that, unless this is removed, it will cause accumulations on the interior of the combustion chamber, and about the valves of the gas-engines. Though the coarse dust might enter the combustion chamber and be carried forward by the expansion of the exhaust, the fume deposit on the surfaces with which it comes in contact would soon reach a sufficient thickness to cause premature ignition through its becoming incandescent.

Though the subject is not exhaustively treated by Mr. Allen (as he himself admits), he shows—as we have indicated by this mention of the contents of the article—that very considerable economy has already been effected in this branch of industry by the advance in chemical and technical application brought about by keen competition.

An Early Water Purifier.—At the meeting in Wolverhampton, last week, of the Institute of Sanitary Engineers, Mr. W. J. Dibdin, F.I.C., F.C.S., read a paper on "The Theory and Practice of Filtration." In tracing the history of filtration, he said the first water purifier for which protection was obtained in this country was that of William Walcott, who in 1675 obtained a patent for the "art of making water corrupted fit for use, and sea water fresh, clear, and wholesome in very large quantities by such ways and means as are very cheap and easy, and which may be done and practised with great speed and expedition." Unfortunately, the inventor did not give the "ways and means" in his specification. The first scientific and practical method of treating hard waters was that of Dr. Thomas Clark, who in 1841 patented his famous method of softening water, which the author proceeded to describe.

MEETING OF THE DUTCH ASSOCIATION OF GAS MANAGERS.

FROM OUR OWN CORRESPONDENT.

Of the many quaint cities in quaint old Holland, perhaps Haarlem is one of the most old-fashioned. Red-roofed, brick-paved, picturesque, and sleepy, Haarlem (which one ought to see from a bird's eye point of view to do it justice) unites the old-worldness of another age with modern progress and science. In it, *l'art nouveau* rubs shoulders with Sixteenth Century architecture; swift and well-equipped electric trams, with smart up-to-date drivers, run side by side with characteristic Dutch canals with slow-moving lazy barges and blue-bloused bargees; while in the streets the noises of modern traffic mingle with the "clang of wooden shoon;" and, to complete the contrast, Haarlem can boast of some scientific institutions of which a much greater city might well be proud. It was, therefore, particularly appropriate that the Dutch Association of Gas Managers should have held their thirty-first meeting under the shadow of Old St. Bavo's.

The programme of the meeting (of which a technical report is given below) was carried out under the presidency of Mr. J. Blom, szn, the able Engineer of the Haarlem Municipal Light Factory, extending over the evening of July 7 and the two succeeding days; and it should be stated at once that the meeting was, from every point of view, an emphatic success.

On the evening of the 7th, the President held a reception of the members, who came from all parts of Europe, and formed a gathering of a thoroughly representative character. The technical part of the programme was taken in a large concert hall called the "Brongebouw" during Wednesday, with an interval for *déjeuner* (provided for all the members); and the discussion was resumed and concluded on Thursday morning. With regard to the programme, which is reproduced *in extenso* below, it is to be remarked how many-sided and practical it was—ranging from China to Peru of gas technics; while the discussion, which was partly in Dutch, French, German, and English, was practical, brief, and to the point. The various reports of Committees, discussions of subjects, and explanations of apparatus followed one another in quick succession; and one could not but notice the earnest manner in which members applied themselves to the matters under notice, and, in contrast to English practice, the way in which manufacturers' opinions were continually invited on subjects which were familiar in their daily work. The spirit of *bonhomie* which characterized the banqueting tables on both evenings was not left ostentatiously outside when the technical business was on the *tapis*. This is evidently one of the things which "they do better" in Holland than in our own country—and, judging from the life and go in the meetings, to the benefit of all concerned.

On Thursday afternoon, carriages were provided to take the members to view the new gas and electric works of Haarlem, where a reception was held by the members of the Gas Committee and the Engineer. The works are described in the report below; and it will suffice to say here that they are an excellent example of modern engineering. The only criticism an Englishman would pass on them is that they have no English work above ground in their construction; but it is only fair to say that in design, finish, and performance they do not seem to suffer from this regrettable lack of English enterprise. To an Englishman, however, Mr. George Wilson, whose fine factory is one of the industrial landmarks of the Hague, belongs the credit of having carried out the whole of the main laying, both on the works and throughout the town; and the manner and method in which this was done is referred to more particularly in our description of the gas-works. It will be of peculiar interest, because, firstly, in a Dutch town, owing to the number of canals, many mains have to be "sunk;" and, secondly, because in Haarlem, owing to the end of the Imperial Continental concession there, a new works in one extremity of the town had to be coupled to the existing mains, which were formerly supplied from the old works at the other end of the town, and that without intermission of the supply.

But to resume. After an hour or so upon the works, clambering up elevator stagings, diving into coal-stores, investigating boilers and electricity plant, and so on, the drive was continued through beautiful country to the rising sea-side place called Zandvoort (*anglicé* Sandfort). At the Grand Hotel there, the official banquet was held (the unofficial dinner having taken place at Haarlem the previous night); and a most enjoyable evening brought to conclusion a very successful meeting. The speeches (as might be expected from the centre of a district where bulbs and flowers are cultivated in reckless and gay profusion) were flowery, eloquent, and witty, and they aroused much enthusiasm. From them, it was gathered that Mr. Blom, szn, completed the new works without hitch for £25,000 below the estimated cost, and that the meeting next year will take place at Maastricht, under the presidency of the able and popular Mr. P. Bolsius, the co-Editor with Mr. C. T. Salomons of "Het Gas."

This occasion will be rendered the more interesting because, through the investigations of Mr. Bolsius, it has been discovered that to Minklers, of Maastricht, belongs the honour of having first made illuminating gas in Holland in about 1785. So Dutchmen,

very properly, consider he should rank side by side with Lebon and Murdoch as gas pioneers; and a statue which is being erected to his memory will be unveiled during the meeting. The occasion is looked upon as one of national rather than local importance; and one may therefore expect that the 1904 meeting of the Dutch Association of Gas Engineers will even rival the 1903 meeting in popularity and success. The following report deals more or less in detail with the technical proceedings; but the discussions on matters of purely local interest are omitted.

Proceedings of the Thirty-First Meeting of Dutch Gas Engineers.

(Vereeniging van Gasfabrikanten in Nederland.)

The chair was taken by Heer J. Blom, szn, the President, supported by Heeren D. van der Horst, N. W. van Doesburgh, C. T. Salomons, O. S. Knottnerus, and J. E. H. Bakhuis (members of Committee.) Heer Bauduin was unavoidably absent.

The President opened the proceedings by welcoming the members (whom he stated numbered just over 300); and after a brief reference to the difficulties caused by recent strikes and the way they had been surmounted, called upon one of the members of the Committee to read the report of the Committee appointed to consider the

Standardization of Meter Unions.

In Holland, the difficulty which is usually experienced by different makers having various sized unions is accentuated by the fact that the German makers use English sizes and the Dutch makers use French sizes. But even then there is variation between the one and the other. It was reported that the Committee had recommended that there should be new standard unions fixed upon, and that money had been voted for a set of steel tools and unions to be deposited at the Polytechnic at Delft. The Committee had also recommended that the dimensions of meters should all be uniform—that is to say, as to height from ground and distance apart of connections, so as to make a meter of one maker interchangeable with the meter of another upon connections already fixed. There is a deadlock with regard to the size of the meters, as several of the makers want their own particular dimensions adopted as the standard size; but all the makers have agreed to supply the standard unions or their own sizes as may be required.

Report of the Coke Commission.

This report was printed and circulated, and was taken as read. The following is a *précis* of it.

The Coke Committee met four times at Rotterdam, to discuss *inter alia* the reasons why coke is not in regular demand as a fuel, when its market price, being compared with those of competing fuels, is taken into consideration, and also to recommend, if possible, means which could be used by which the gas undertakings can promote a more general use of coke. It was agreed that slow combustion stoves answered very well for coke consumption, as they not only continued burning during the night, but could even be left alight in a place of business on Saturday, and be still alight on Monday. On this question, it was pointed out that it was important to become well acquainted with what quality of coke was most suitable for combustion in fuel stoves, and to regulate the supply accordingly. With a view also of obtaining suitable stoves, efforts have been made by the Committee to induce makers to modify their stoves, so as to make them thoroughly fitted for the combustion of coke. The Committee pointed out the value of coke for use in different industrial enterprises, as they found that its fuel value was higher than coal. In 1883, experiments were made, under the auspices of the Société Industrielle et Commercielle des Métaux, with four steam-boilers, each having a heating surface of 120 square metres (1300 square feet); and the published result showed that 1 kilogramme of coke produced 8·5 kilogrammes of steam, while 1 kilogramme of coal produced only 7·4 kilogrammes of steam, giving the coke value 13 per cent. more than coal. Another set of experiments by Mr. Vincotte, and also one at Colmar, confirmed, if not actually these figures, at any rate the fact that coke has a higher fuel efficiency than coal. The Committee pointed out that in large cities many steam-engines consume coke; also locomotives in Paris and Berlin. In America, the Boston and Maine Railway Company use coke too, as it is considered that it has the advantage of not giving off smoke; while the expenses are the same, and there is less danger of fire. This particular Company effect a considerable saving in compensation for fires, as there are not so many sparks from the flues of passing locomotives. The questions to be considered are: How are the public to be made acquainted with the advantages of coke; and how is the prejudice of the public, due to the use of unsuitable stoves, to be minimized and the advantages of coke brought home to them?

The main points of the Committee's report are—

1.—That it is recommended that pamphlets and periodicals should be circulated among the public, making them acquainted with the fact that coke affords a good, clean, hygienic, easily managed, and advantageous fuel, causing no soot, smoke, danger of fumes, nor fires.
2.—That the sale of selected coke be recommended, and that those in charge of gas undertakings should inform the public of its quality and how to use same.
3.—That steps should be taken to enable the public to obtain stoves suitable for coke combustion.
4.—That experiments should be made and any other experiments noted, and the results published and circulated.

Sulphate of Ammonia and Coin-Counters.

A sum of money was voted for the expense of the printing and circulation among agriculturists of a pamphlet pointing out the advantages of using sulphate of ammonia as a manure. An amount had already been voted, but had been exhausted upon the previous circulation of pamphlets, which it was now desired to continue.

Messrs. Elster, of Berlin, showed a coin-counter of ingenious construction, if, as a demonstration showed, it also possessed a somewhat wayward and erratic disposition. The apparatus consists of a small hopper-shaped shoot, whence the coins are passed, being regulated by a hand-revolved drum, into removable tubes, which are filled with 40 coins and then sealed up. Mr. R. Zijlstra, the Engineer of the Light Factory at Amersfoort, also showed a simple device of his own contriving, in which the coins are placed in an open-ended tube, which is stood upon a tray having perforations large enough to admit one coin, and being filled, is moved over the tray, letting one coin drop through each hole.

The New Gas-Works at Haarlem.

The President then gave a very lucid description of the new gas-works at Haarlem, which was illustrated by diagrams and drawings. The following description is made up from a *précis* of his remarks, and from information gathered from an inspection of the works during the excursion referred to above.

The town of Haarlem was, up to Dec. 31, 1902, lighted by the Imperial Continental Gas Association; but the township did not renew the concession, and decided to establish works for the manufacture and distribution of gas and electricity. The contracts were let on Jan. 3, 1901; but, owing to frost, no work was commenced until Feb. 28 of the same year. The works stand on an area of 70,000 square metres (17¾ acres), and are alongside the River Spaarne; so that coal can come direct from collieries, by water, in boats containing 1000 tons. The establishing of the works necessitated a new bridge over the Spaarne, to make a connection with the town of Haarlem. The plans of the works were got out by Mr. J. Blom, szn, formerly the Engineer at Arnhem; and though it was decided to go to the expense of constructing a works on a thorough basis of labour-saving machinery, the whole cost of the works and the mains fell short of the estimates by £25,000.

The coal is discharged from the quay (which had to be constructed), and conveyed to the retort-house by a travelling crab worked by an electric motor—figs. 1 and 3, pp. 166-7—made by the Haarlem Machinery Company, to the drawings of the Brown Hoisting Machinery Company, of Ohio, U.S.A. The hoist has a capacity of unloading and conveying to the coal-store 300 tons of coal in ten hours. The hoistway is supported on two bridges, and is 55 metres (180 feet) long between the spans. The hoist is worked by a 75-horse power electric motor at the quay side, where the driver can observe the work in progress, and the crab discharges into a waggon having a capacity of 1½ tons.

The coal-sheds have a capacity of 10,000 tons; and the coal is conveyed by the waggon on two sets of inclined rails, where, by means of an adjustable stop, it is shot into either of the coal-stores, at any desired point; the waggon being then hauled to the end of the elevated rail by a wire rope actuated by electric power. Beneath the coal-stores travel two rocking coal-conveyors, having a length of 80 metres (262 feet). Numbers are marked upon the girders above the coal-stores, and these numbers correspond with numbered shoots; so that the coal can be discharged into the conveyors at any point. The coal being taken into the conveyor, which is on the Marcus system (made by Luther, of Brunswick) is conveyed to the centre of the retort-house and lifted, by means of a bucket elevator, into the hoppers on the charging stage of the retort-house. The rocking conveyor does not itself travel, but throws the coal forward by a series of strokes, the effect of each stroke taking place with the travel of the elevator buckets, which are thus filled.

The retort-house, which is neatly finished and ventilated, has a capacity of sixteen sets of nine through inclined retorts on the Coze system, of which twelve sets are at present erected; the fittings being the work of the firm of Didier, of Stettin. The system of firing is full regenerative; the producers being arranged in a convenient manner. We were informed that two men on the charging floor attend to six sets of nine retorts; while three are required on the discharging floor. The retorts are 4½ metres (15 feet) long, with a capacity of 6 cwt. The gas made per set of nine is from 3000 to 3500 cubic metres (about 115,000 cubic feet) per day. The coke, other than that required for the producers, is conveyed to the centre of the retort-house, where it is elevated to the coke-breaker by a De Brouwer hot-coke conveyor. It will thus be seen that from the time the coal is brought alongside the quay, right through the process of gas making, neither it nor the coke is touched by hand; the only labour required being men to work the electric hoist, a man to open the shoots to the rocking conveyor, and the carbonizing men. It should be stated here that the power for the above-described work, whether direct steam or electric, is supplied from the electric central station, which is on the works, and will be described hereafter—see fig. 2.

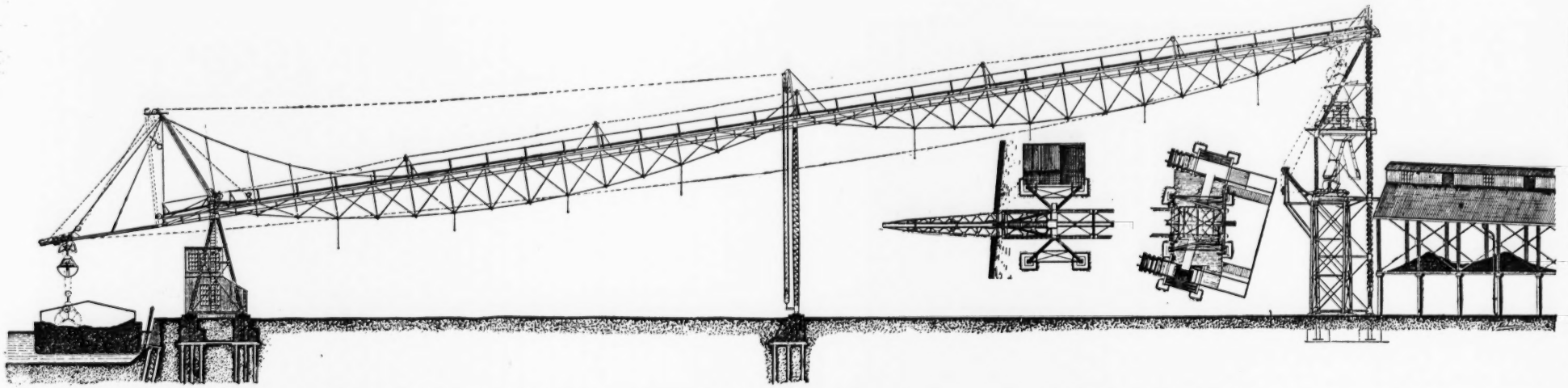


FIG. 1.—THE ELECTRIC COAL CONVEYOR (WITH PLANS OF END AND HEAD OF CONVEYOR) AT THE HAARLEM GAS-WORKS.

The gas passes to two air condensers and a water condenser, made by Smulders, of Utrecht. The exhausters are situated in the electric central station. There are at present fixed three, each having a capacity of 20,000 cubic metres (about 700,000 cubic feet) of gas per twenty-four hours. Room is provided for a fourth when required. The gas is washed and scrubbed in a Kirkham washer and a scrubber made by Smulders, of Utrecht. These are situated, together with two Pelouze tar-extractors, in a covered house next to the purifier-house. There are four purifiers, each 9 metres (30 feet) square, with centre valves. The floor of the purifying-house, and also the washer-house, can be lifted up and removed in sections.

There are two cylindrical station meters, each having a capacity of 20,000 cubic metres (700,000 cubic feet) per twenty-four hours fitted with tell-tales; while the governor is also fixed in the same house. There are two gasholders, made by Klönne, of Dortmund, each having a capacity of 15,000 cubic metres (530,000 cubic feet). The holders have brick and iron annular tanks, furnishing a store room, after the manner commonly seen on the Continent. A nicely fitted laboratory and spacious offices complete the gas portion of the well-equipped works; and though they have not been in action long enough to report as to the output and costs, yet the results so far have been eminently satisfactory to the town and to the Engineer-in-Charge. A noticeable point is the extreme care and finish with which the buildings have been constructed; and if the proverbial term "as clean as a new pin" is ever justified, it certainly is in the case of the Haarlem Gas-Works.

Before passing to a brief description of the Electricity Department, it is well to mention that the main-laying and connection to the existing mains in the town formed not the least important part of the enterprise; and this was undertaken by the firm of George Wilson, of the Hague, which firm the meeting was glad to learn had just received a gold and a silver medal at the exhibition at Groningen. In a Dutch town, owing to the number of canals,

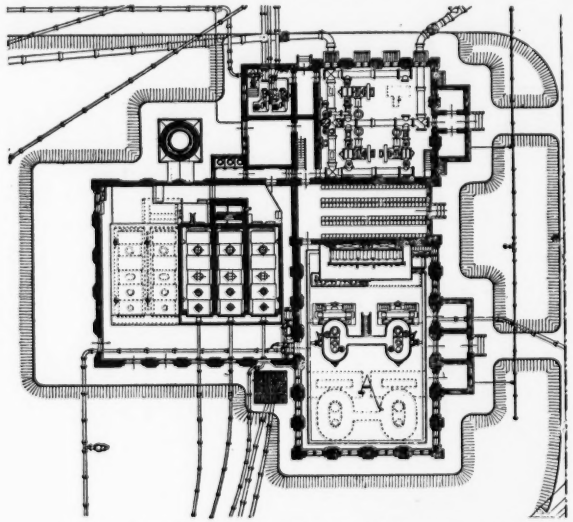


FIG. 2.—THE ELECTRIC CENTRAL STATION AT THE HAARLEM GAS-WORKS.

the mains have to be constructed with suitable bends. They are then sunk bodily across the bed of the canal, and then connected up. This being a process which is very seldom required in England, we reproduce a photograph (fig. 4) of one of the mains being sunk into the Spaarne. Six 24-inch and two 12-inch mains had to be sunk for the work under description. The mains were simultaneously shut off from the old works and connected to the new works on Dec. 31 last (the ceremony being performed by the Chairman of the Gas Committee), without any suspension of the supply.

The electric central station is shown in plan. The power used here, and for all purposes in the works, is generated in three double furnace Lancashire boilers, each having a heating surface of 86 square metres (920 square feet) and working at 150 lbs. pressure. The fuel used is broken coke. The engines are two vertical compound condensers, giving, at 150 revolutions, a maximum of 350 indicated horse power. These are coupled direct to two Siemens and Halske shunt dynamos, each having a capacity of 400 to 440 amperes—500 volts. The current is stored in a spacious accumulator house, and is supplied to the town at varying prices; the charge being 40 c. to 18 c. (8d. to 3½d.) per kilowatt-hour for light, and 16 c. to 9 c. (3¼d. to 2d.) for power. The charge for gas is 7 c. per cubic metre (equivalent to 3s. 4d. per 1000 cubic feet); if by prepayment meter, with fittings found, 8 c. (equivalent to 3s. 10d. per 1000 cubic feet).

QUESTIONS FOR DISCUSSION.

The first two questions for discussion were: "What must be the yearly production of a coal gas factory so that inclined retorts and mechanical transport for coal and coke may be adopted with financial advantage?" and "Is it possible that in factories of moderate size and provided with horizontal retorts, mechanical charging and coke conveying arrangements can be used to real advantage?"

The Secretary read a contribution sent by Heer Bauduin, of Maastricht, who was prevented from being present. He said he had seen it stated that the adoption of inclined retorts and mechanical conveying would pay on a works having an output of

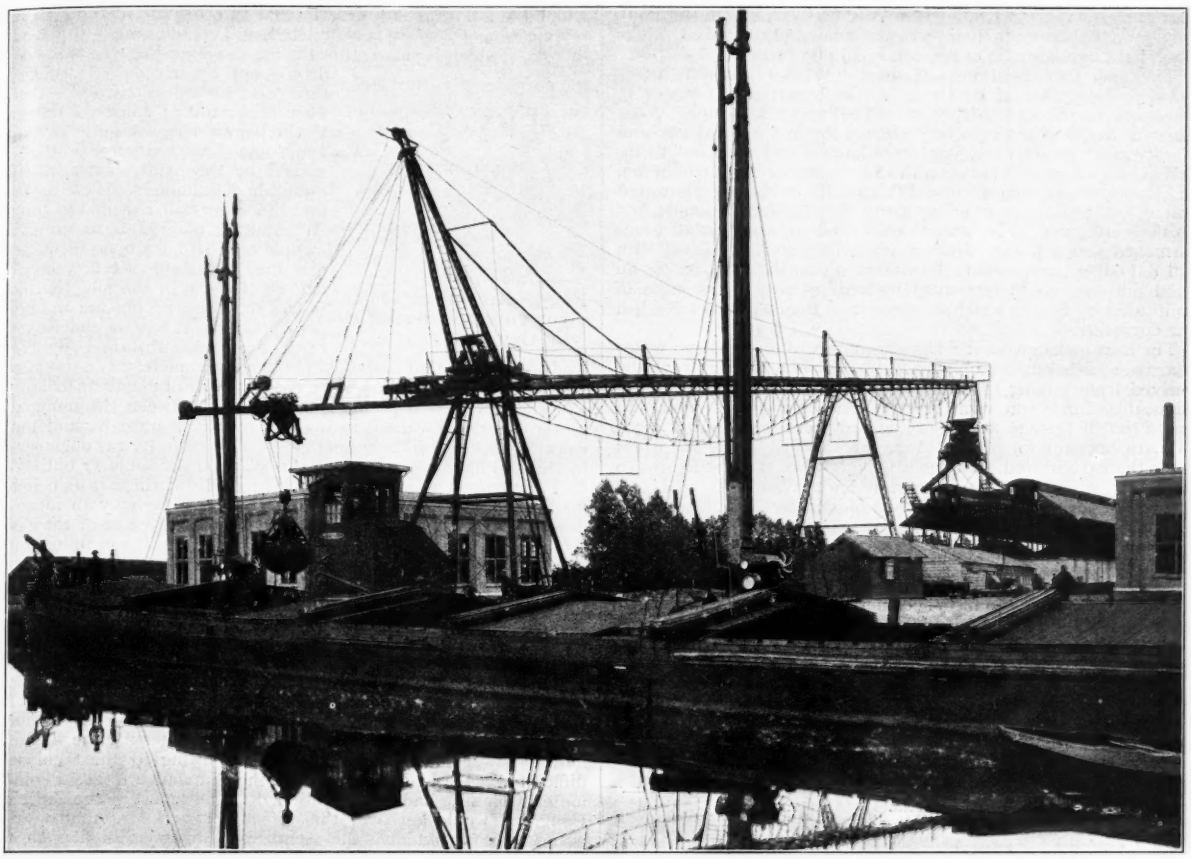


FIG. 3.—A VIEW OF THE ELECTRIC COAL CONVEYOR (REPRODUCED FROM "HET GAS,").

3 million cubic metres (105 million cubic feet) yearly. He did not, however, agree with this, as, from investigation, he found that the ratio of capitalization, comparing ordinary settings with inclines having regenerators and conveying apparatus, is as 28 is to 60. He thought that upon a works having a minimum capacity of about 6 million cubic metres (210 million cubic feet), the adoption of inclined retorts and conveyors would pay. M. J. de Brouwer, of Bruges, said that it formerly cost him 2 frs. (1s. 8d.) for the ordinary carbonizing wages per ton of coal for horizontal retorts with direct firing, that he had been gradually introducing mechanical means with inclined retorts, and that when he had completed his scheme he estimated that the wages of 2 frs. (1s. 8d.) per ton of coal carbonized would be reduced to 65 centimes. (6½d.). This was on a basis of inclined retorts with generators and coke-conveyors; all the power used being electric, generated by gas-engine-driven dynamos, working with gas made on the works. In comparing the above figures for carbonizing wages, it should be borne in mind that they are on the basis of 20s. per man per week.

The next question was as to the experience with a particular

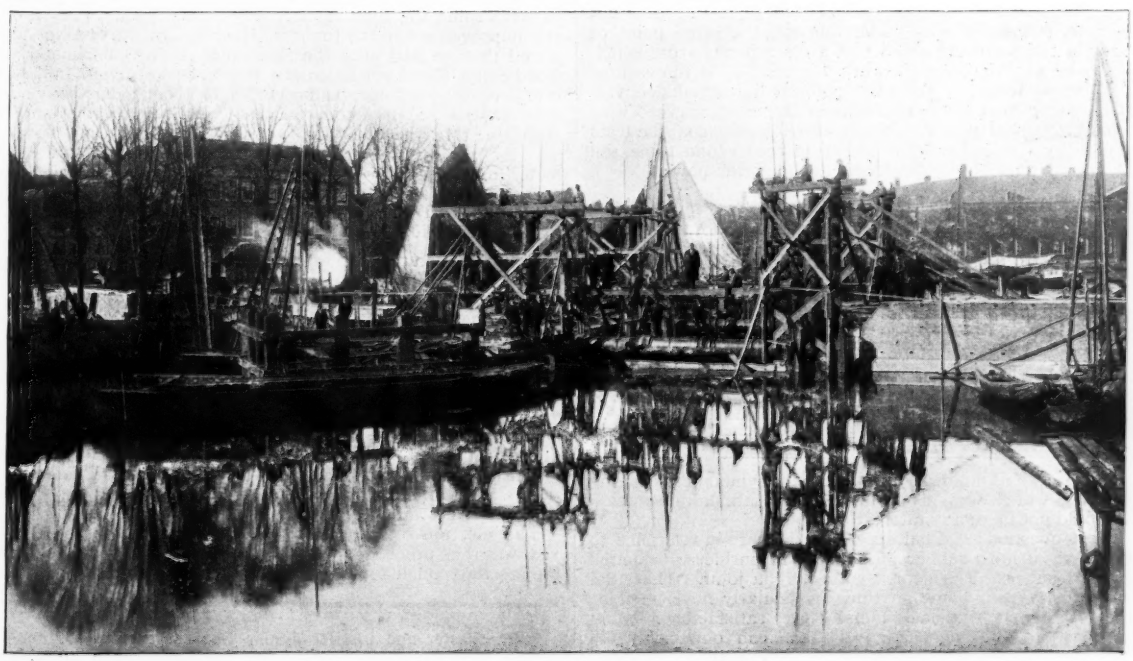


FIG. 4.—LAYING A GAS-MAIN IN THE BED OF THE RIVER SPAARNE.

sort of fire-clay from Kralingsoke Veer (works near Rotterdam). Several members gave their opinions, some finding it good, others not; but the consensus of opinion was in its favour.

The next two questions—namely: "What relation is there between the price of coal gas and carburetted water gas in reference to the present prices of coal and oil?" and "What stage in a gas-works is to be preferred for mixing coal gas and water-gas?" produced a very hot debate, and resolved themselves into arguments between the advocates of the introduction of blue water gas into retorts and those of the ordinary carburetted water gas practice. A great many figures were quoted; but as they appeared to be special ones, and were not in all cases furnished with full data, and as, when they were furnished with full data they appeared to be drawn up on different bases, no good purpose would be served by adding here to the mass of contradictory figures which are already at the disposal of English gas engineers.

The next question was: "Does a mixture of coal gas and water gas give a higher calorific value and power of light than would be derived from mixing the composing parts?" Here, again, the advocates of blue water gas brought forward a mass of figures to prove that if their system was adopted there would be a large gain, to account for which they put forward many theories; while the carburetted water gas makers also brought figures to show that, when they mix carburetted water gas with coal gas, the candle power of the mixture was higher than the mean of the candle power of the composing parts.

Among those taking part in the discussion on this and the previous subject, were Heer van der Willigen, Heer W. C. P. Asselbergs, pz, Mr. Jacques Abady, and others. Mr. Abady gave some figures, which we reproduce, showing that, when there is a mixture of carburetted water gas and coal gas, if the analyses of each separate gas and the mixed gases is taken, and the theoretical calorific value of each is adduced from Julius Thomson's standard

TABLE A.

—	Carburetted Water Gas. 24 Candles.	Coal Gas, 15 Candles.	Mixed Gas, 50 per Cent. of each, = 19·5 Candles.
	P.Ct.	P.Ct.	P.Ct.
Benzene (C_6H_6)	0·40×3807·4= 15 2	0·5= 19·04	0·450= 17 12
Olefines (C_nH_{2n})	11 70×2235·0=261 5	4 0= 89·40	7·850=175·45
CO . .	32·40× 323·5=104·8	8·8=284 60	20·600= 66·63
H_2 . .	35·57× 326 2=116·0	49·9=161·78	42·735=138·89
Ethane .	4·71×1764·4= 83·1	.. ..	2·355= 41·55
Methane.	9·84×1009·0= 99·2	33·2=334 98	21 520=217·09
$CO_2O_2N_2$	5·38× 0 = 0	3 6= 0	4 490= 0
	100·00 =679·8	100·0=633·66	100·00=656·73 B.T.U.

figures, it will be seen that the calorific power of the mixture would be the same as the mean calorific power of the component gases, but that it might often—and, as a matter of fact, does often—happen that if the component and resultant mixed gases are compared on an illuminating power basis, there will be a discrepancy between the mean theoretical illuminating power and the actual illuminating power of the mixture. He ascribed this to the fact that, in testing different illuminating powers, it was impossible get the same point of efficiency in the test burner; so that a discrepancy arose which was not to be explained on theoretical grounds. If the various gases could be tested at the same point of burner efficiency, it would be found that the actual illuminating power agreed with the mean theoretical power. It was also found that if the tests were made by a calorimeter, as shown in the second table, the calorific power agreed with the theoretical calorific power.

TABLE B.

—	Coal Gas.	Blue Water Gas.	Mixtures.
Candle power . .	19·5	0	70 p.ct. coal gas 30 ,, water gas
Calorific power . .	680 B.T.U.	352 B.T.U.	Candle Power: Theoretical, 13·65 As tested, 14·5 Calorific Power: Theoretical, 581·6 B.T.U. As tested, 581 B.T.U.

Several questions followed, propounded by members desiring information, which was given in a conversational discussion that it would not be of any interest to report.

The next question: "What experience is there in reference to the tightness of india-rubber joints used in purifiers?" elicited from one member a design for a gutta-percha joint. There did not, however, appear to be anything particularly novel in this; but the designer stated that he found it very satisfactory.

The question following—namely: "How can one easily tell whether oxide of iron has been revivified sufficiently for renewed use?"—caused Heer W. Niermeyer, of Arnhem, to bring before the members a simple little apparatus illustrated below, and of which the following is a description: In order to ascertain if the revivication of bog ore is completed, an average sample is placed in a flask, which is closed after the air above the bog iron has been driven out by oxygen. The glass tube A is then connected, and sealed by a beakerfull of coloured water. If the bog iron is not quite revivified, some of the oxygen will be absorbed by the oxide, causing a diminution of volume inside the flask; and the water will rise in the tube A. Another method is to draw a sample of air from a mass of oxide, and then ascertain just how much oxygen there is in the air. If this is less than the proportion usually present in air, it follows that some of it has been absorbed by the oxide—showing that revivification is not complete.

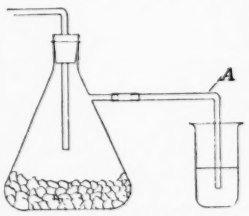


FIG. 5.—NIERMEYER'S TEST FOR THE REVIVIFICATION OF OXIDE OF IRON

The next question was as to the desirability of members making experiments to fix if possible the relation between the nominal power of gas-light, the light from incandescent burners, and the calorific power of illuminating gases. Apparently, gas engineers in Holland have not yet done much work on the subject; but Mr. C. T. Salomons pointed out the desirability of these tests being made, especially as he found that the light given by an incandescent burner bears more of a ratio to the heat value of the gas than to the illuminating power. With regard to the examination of the nominal illuminating power, he confirmed the difficulties that have already been mentioned, owing to the absence of a burner which would give the same efficiency with different illuminating powers.

Mr. D. van der Horst showed that Dutch engineers had not been idle in this particular respect, as he produced a burner with an adjustable central air supply which was at the present time the subject of experiments by the Photometrical Committee of the Dutch Association of Gas Engineers. Mr. Salomons said that great difficulty had been experienced in testing the illuminating power of incandescent burners owing to the "colour difficulty." He believed, however, the Simmance-Abady Photometer, which he had seen mentioned in the report of the Zurich Congress, would get over this difficulty; and Mr. Abady was asked if he would give the members a demonstration upon a future occasion.

The next question was as follows: "What method of gas enrichment is most advantageous and trustworthy as regards permanence; and what is the limit of the carrying power, by coal gas or water gas, of benzol or carburine vapours." Several members took part in the discussion; and the conclusion arrived at, as might have been expected, was that the limit of the carrying power depended upon the vapour tension of the gases, or the vapours added, and facts were deduced with which English engineers are perfectly familiar. This question provoked another discussion as to the permanency of benzol enrichment, which elicited widely varying opinions.

The next question of interest was as to whether there had been any improvements in the Junkers calorimeter, and what had been the experience with the Simmance-Abady calorimeter. Several members stated that they had used calorimeters—some the Junkers, some the Simmance-Abady—and they did not know of any improvement in the Junkers. Heer R. Zijlstra, of Amersfoort, stated that he had used the Simmance-Abady calorimeter, and that he had found it particularly useful, because he could leave it in action throughout the day and take a test at any convenient interval, and that he found the tests were very concordant and accurate. Mr. Jacques Abady, at the request of the President, gave a demonstration of the use of the Simmance-Abady calorimeter, explaining the new automatic arrangement by which all personal error at the commencement and finish of a test is done away with, and which makes the taking of a calorific test practically automatic.

It will be seen that the system which prevails with this Association is not that of having a few set papers read, as is the case in England. The members are encouraged to send in during the session queries and matters for discussion which have been suggested by contingencies in their own practice. A programme is made up from this, and printed and circulated among the members; so that nearly all the subjects are dealt with pithily, and a great deal of work is thus got through. There were no less than 24 subjects on the *agenda* paper—some of merely local and some of general interest; and it is the latter which have been reported above.

The following Englishmen were elected members of the Association: Mr. Edmund G. Smithard, of King's Lynn; Mr. Jacques Abady, of Westminster.

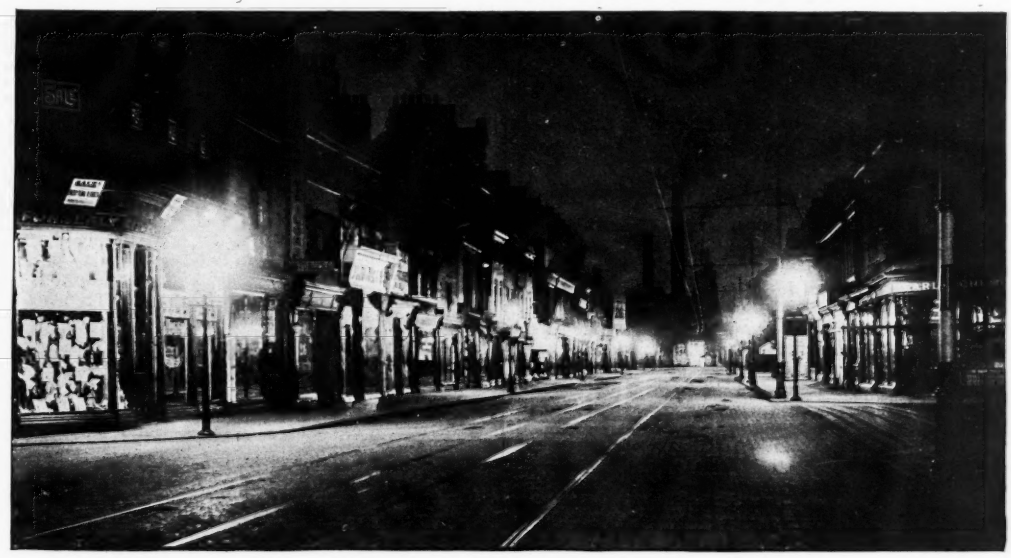
The election of the officers and Committee for the ensuing year was then proceeded with; and after the usual votes of thanks, the meeting concluded.

Manchester and District Junior Gas Association.—A meeting of this Association will be held next Saturday, when, by the kind permission of Mr. J. C. Belton, a visit will be paid to the Chester Gas-Works. The members will meet at the works at 2.45 p.m.

A MIDNIGHT PHOTOGRAPH.

We have had in our possession from time to time several photographs (some of them have been published) of the lighting of interiors by incandescent gas-burners of various descriptions; but few of street lighting by the same means. The one which is reproduced here contains many interesting points; if it were otherwise, the sender would not have been Mr. John Young. It portrays the lighting of one of the streets of Hull at midnight. The lamps are fitted with clusters of five "C" burners and ramie mantles; and the burners are governed and regulated to pass 3·7 cubic feet of gas per hour. The average efficiency is 25 candles per cubic foot, which is exceedingly good for "C" burners. It will interest photographers to know that the photograph was obtained on a "Sovereign Imperial" plate, and that a twelve minutes' exposure was given with a F 8 stop.

One of the peculiarly interesting features of these photographs of incandescent lighting is the proof they give of the great diffusive power of this type of light. Round the lamp heads, there is a perfect halo, which is so intense in its brilliancy as to obscure all trace in the pictures of the form of the lanterns. Nothing of this kind is to be seen with photographs of electric arc lamps. The light in their case is so concentrated that the head of the lamp simply comes out with clear definition—without any indication of the soft diffusive power of the incandescent gas-light. From a photograph such as this from Hull, it is difficult to judge of the illumination of a street as a whole. Some critics would say there is a spottiness about this one, and that the lighting is not by any means uniform. This is merely one of the effects of perspective photography under these conditions, where there are several powerful centres of light. Take the foreground of the picture, and the illumination from the lamps there is that which obtains throughout the street. That it is a good illumination all round is found by making a very brief study of the picture. At the ground-level, the character of the paving is distinct, as are also the tram-rails; the shop announcements are clear; and even above, where lighting is not a matter of importance, the electric trolley wires are visible throughout the length of the street. The photograph is certainly very interesting.



A Gas-Lit Street in Hull at Midnight.

THE GAS AND WATER STOCK MARKET.

Business last week on the Stock Exchange was very quiet. The inclination for the most part was dull, though things brightened up momentarily from time to time. The dominant factor was still the American Market, which in the earlier part of the week was in a very agitated condition, though the apprehension was partially allayed before the close. But whether the worst of it has yet been seen, is a question with some. The only market that did tolerably well was the gilt-edged, where cheap money went for investment. Affairs in China were more hopefully regarded. In the Money Market, there was no fixed tendency. At times there were symptoms of hardening; but, on the whole, the tone was fairly easy. There was some fluctuation in discount; but by the close there was hardly any change. Business in the Gas Market was quiet, and so devoid of any eventful movement that, on the London Stock Exchange, there was only one change of quotation. This, however, is no new tendency, though it is an extreme case; for it is generally recognized that, during the last six months, there has been a degree of sluggishness that has not often been exceeded. We shall now soon be receiving accounts for the half year and dividend announcements; and they may perhaps have the effect of instilling a little life into a market that is suffering from prolonged inanition. In Gaslight and Coke issues last week, a little business was marked daily in the ordinary, which opened at 83¼, and closed at 83⅜, the extreme intermediate range of prices being 83-84⅜. Dealings in the secured issues indicated firmness in the maximum and debenture stocks; but the preference did not command very good prices. Two or three transactions were the sum-total in South Metropolitan; but there was no sign of giving way for lack of support. Some Commercial stock was let go "specially" at low figures; but the general position was unchanged. In the Suburban and Provincial group, there was almost an entire absence of business; but Alliance and Dublin, which was not dealt in, was lowered fractionally. In the local market, Newcastle debenture advanced slightly. In the Continental Companies, there were a few transactions in Imperial at about middle prices. European, which appears from the proceedings at the general meeting held last week to be doing well, was in some demand. Nothing was done in Union. The remoter undertakings presented no feature calling for remark. The Water Companies were all very quiet, except New River, which had one busy day, and changed hands at such good figures as to warrant a revision of the wide nominal quotation which is allowed to remain in the list. The public do not like these wide margins; and we cannot believe that they are conducive to business.

The daily operations led to no change of quotation until Friday, when Alliance old receded ½. The Water Companies were similarly treated until Saturday, when East London fell 3.

FROM EARLY VOLUMES OF THE "JOURNAL."

Oct. 10, 1849.

The leading feature of the month is the complete registration of the Great Central Gas Consumers' Company of London, under the 7 and 8 Victoria, chapter 110, and the probability that, in some portion of the Metropolis at least, the experiment will be tried of selling gas at 4s. We cannot but regret that our suggestions for placing the supply of this necessary article of life upon a sound basis have met with such feeble support among the more important companies, whose interests must be affected by the experiment about to be tried. Some may fancy themselves beyond all danger; but the wedge, when once entered, becomes irresistible, and the strongest must in the end yield to its influence. The energy of a new and progressive body—enthusiastic in its feelings, earnest in its exertions, and persevering in its agitation—must soon find an echo in quarters as yet considered secure against their consequences. We do not wish to express ourselves too despondingly on the subject; but we cannot conceal our conviction that a grave error has been committed, and an opportunity lost which might have placed the millions invested in the Metropolitan gas-works upon a secure basis. As it is, we see before us diminishing revenues, increasing expenses, and an ultimate loss of one-half of the capital invested. And we are not alone in our views. Every intelligent director and manager of the larger Provincial gas-works with whom we have conversed, has fully

coincided with us, and highly approved of the suggestions we have from time to time promulgated on this subject. If they have been unheeded, the fault is not ours, but must rather be sought for in the petty jealousies which unfortunately interfere to prevent a cordial union among the several members of the gas body—jealousies unworthy of the great interest at stake, and, in our opinion, fatal in their consequences.

A Spontaneous Evolution of Gas at the Village of Charlemont, Staffordshire.—In a field by the side of a lane near the village of Charlemont, in Staffordshire, certain patches of ground had been noticed which, without any apparent cause, were destitute of vegetation. They excited little attention, as they were supposed to be what are commonly called fairy rings; and it was not until the summer of 1846 that their true character was discovered. The person who first paid particular attention to the cause of these barren spots was the tenant of a neighbouring cottage (at which there is a cold bath, noted in the vicinity for its sanative properties). From certain circumstances, he was led to believe something permeated the earth in those spots, and, having dug a hole, he inserted a gas-pipe, and, on applying a light to the mouth of the pipe, he found, to his great surprise, that a large flame issued from it. It was not long before he conceived the idea of applying it to domestic purposes; and, in pursuing his experiments, he found that it was not necessary to convey it from the place where it was first discovered, at a distance of about 150 yards from his house, as, on driving a pipe some inches into the ground under the floor of the cottage, he procured a continuous flow of gas. There are at the present time seven burners in the cottage, which enable the owners to dispense with fire and candles. The next cottage is supplied with two. It appears to make no difference to the supply of gas if allowed to burn for weeks together, and the flame is always of the same colour. In windy weather, the flame is generally unsteady; when there is a blast of wind outside, the flames of gas rise several inches, but as each blast dies away, they return to their original size. The escape of gas is larger in wet weather than in dry; but whether the gas is produced near the surface or otherwise has not yet been satisfactorily ascertained. The place where it issues from the earth is quite a mile from any coal-pit, and is outside the eastern edge of the Staffordshire coal basin. The gas was composed principally of light carburetted hydrogen. One thousand volumes of the gas, as it rises, produced 996 volumes of light carburetted hydrogen, 3 of carbonic acid, and 1 of aqueous vapour and nitrogen. Its specific gravity is ·56126. Its composition is somewhat different from the gas known as marsh gas, and from that which collects in the old workings of mines, as it contains less carbonic acid and less nitrogen; the proportion in marsh gas of the former being one-twentieth, and of the latter one-fifteenth to one-twentieth, whereas in this gas the proportions are only three-thousandths and one-thousandth. It burns with a pale blueish-white flame, emitting considerable light and heat. Mixed with atmospheric air or oxygen, it explodes with considerable violence on contact with flame or with the electric spark. As it issues from the pipe, it has a moist or slightly musty smell, as of sticks partially decomposed; but, after keeping for some time in stoppered glass jars, this is lost, and it becomes perfectly inodorous. When inhaled in large quantities, it produces the same effects as hydrogen gas; but it does not appear to exert any evil influence on the health of the inhabitants of the cottage when diluted with a large portion of atmospheric air.

PERSONAL.

Mr. Robert English, who, since the removal of Mr. G. P. Lewis to Aldershot, has been filling the position of Assistant to Mr. S. Y. Shoubridge at the Crystal Palace District Gas Company's works, has obtained the appointment of Assistant-Engineer to the Christchurch (New Zealand) Gas Company.

References were made at the meeting of the Plymouth Town Council yesterday week to the pending retirement of Mr. J. T. Bond from the chairmanship of the Water Committee; and Mr. Winnicott moved a vote of thanks to him for his services in this position. He said that during the construction of the Burrator reservoir, and in connection with other works for the improvement of the undertaking, Mr. Bond had done magnificent service to the town.

There were 24 candidates for the position of Gas Engineer to the Halifax Corporation, rendered vacant by the resignation of Mr. Thomas Holgate. These were first reduced to eight, and eventually to two. The successful applicant is Mr. John Wilkinson, F.C.S., Manager of the Grimesthorpe station of the Sheffield Gas Company. He is 35 years of age, and before obtaining the appointment at Sheffield, in October, 1901, he was Engineer and Secretary to the Drighlington and Gildersome Gas Company; and he had previously been Assistant-Manager at Pudsey. He was for a time the Honorary Secretary of the Manchester District Institution of Gas Engineers, having been chosen for the position on the retirement of Mr. Mellor rather more than two years ago; but he resigned shortly after moving to Sheffield, and was succeeded by Mr. Shadbolt. He joined the Institution in 1894, and four years later became a member of the Gas Institute. The other selected candidate for Halifax was Mr. John Power, Assistant to Mr. J. Ferguson Bell, at Derby.

COMMUNICATED ARTICLES.

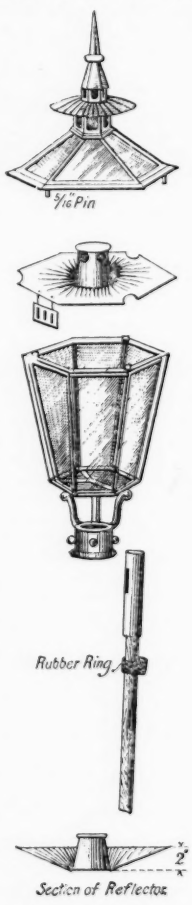
INCANDESCENT LIGHTING IN WESTERN AUSTRALIA.

By W. G. Quicke, the Engineer to the Perth (W.A.) Gas Company, Limited.

Situated as we are on the extreme border of Antipodean civilization, within the youngest portion of the Australasian Commonwealth, and isolated, even in the supply of coal, from all commerce other than by oversea traffic, there is a difficulty in convincing a public well versed in the use of electric lighting of the efficiency and economy of incandescent gas lighting, and perhaps more so on account of their past experience of colonial gas-works, where the ancient routine is only just emerging from that lethargy which characterized English works of twenty years ago.

The average Westralian, until quite recently, considered the use of gas for lighting a retrograde movement; some of the leading firms expending as much as £35 to £40 per month for electric lighting, which could be effected with the Lucas lamp at one-third the cost. Even cooking and heating by gas is to the majority fraught with danger, destructive to viands, and excessive in cost; our only consumers under this heading being largely from the Eastern Colonies, New Zealand, and Great Britain.

In reviewing, however, local events of the past two years, it is some satisfaction to note the gradual weakening of prejudices, the equal of which any citizen of a small town in England would smile at, of erroneous ideas on the merits of gas for various purposes, of the ignorance shown in the construction of appliances and connections, not to omit the preposterous methods adopted by so-called local fitters—in reality plumbers—in the use of gas for lighting purposes. All this has given way to a new order of things, which, after years of controversy and repeated experience, has culminated in the public lighting of our city being converted from the ancient 4 cubic feet flat-flame to the Welsbach incandescent system of 3 cubic feet per lamp per hour; while the maintenance, lighting, and extinguishing, hitherto carried out by the City Council, has been taken over by the Gas Company at a fixed cost per lamp per annum. As this entails a saving of some £300 a year for gas, the Council have no ground for complaint.



In addition, the Gas Company have also undertaken to lay street mains throughout the various portions of the city now lit by kerosene lamps, and to erect some 300 new lamps fitted with Welsbach incandescents, to replace the present oil system; the whole—mains and lighting included—to be completed within three years.

The 431 lanterns were converted during last month's moon service [May], and so far the City Council and public generally are well pleased with the change.

The occupants of some shops and houses, who hitherto declined to use gas, have since made a request for fittings and incandescents.

In converting the lanterns, we were committed to the existing type of hexagonal shape, constructed of cast iron; the centre and bottom frames forming the body proper—being connected together by three $\frac{3}{8}$-inch diameter rods, each rod screwed through the bottom frame and bolting the lantern to the cradle or chair, which, in turn, is secured to the column in the usual way. The centre frame is fastened to the three rods at the top by suitable nuts; the grooves in the framing carrying the glass sides, which abut against each other, forming a lantern having the minimum of obstruction from framing. The crown or top frame fits into the centre frame by means of three $\frac{5}{16}$-inch pins, fitting alternately between the lantern rods, the whole capped by a ventilator, and finial.

To clean the lantern sides, it is necessary to remove the crown; and, taking advantage of this construction, I designed a sheet-iron reflector, with a convex dip of 2 inches into the lantern to fit the space between the crown and centre frame. In this I cut a 3-inch diameter aperture, and added a short chimney and cap (as shown by the sketch), to prevent down-draught. The reflector is

painted with "Velure" (white), and can be renewed as required. The properties of this paint have yet to be proved; but so far it is standing fairly well.

The usual trap for this lantern is hardly suitable for incandescents; but we have made it adjustable to the Simmance-Abady torch, which we have also adopted.

The incandescent burners are of the "C" pattern, fitted, having a given distance from the underside of the burner to the underside of the bottom frame of the lantern; thus ensuring all chimneys being a given height. To the torch I have affixed a rubber ring (an idea that occurred to me to prevent mishaps); and the lamplighter, on turning the cock immediately under the trap, projects the torch into the lantern until stopped by the rubber ring. This indicates the position at which to press the button, the jet is operated with certainty, and the torch withdrawn without fear of damage—the rubber at all times serving as a preventive to jarring the lantern or touching the reflector. This torch works very well indeed, in the hands of careful men.

Our great anxiety is mantles; and at such a distance from the world's markets, it is difficult to secure a really good mantle without a long series of tests. Unfortunately our supplies from Sydney have failed to fulfil our expectations, both "C" and Lucas mantles having proved during the past three months quite useless—60 per cent. not surviving the ordeal of burning off, and generally splitting from crown to fringe. We have, however, been testing others which are proving more satisfactory. Providing we can ensure a good supply of reasonably good mantles, our business promises a rapid extension, particularly for Lucas lamps, of which we have fitted up 96 in four months.

GAS-WORKS VALUE ENHANCED.

By Edward A. Harman, M.Inst.C.E.

It is not generally appreciated that during the past decade many special circumstances have combined to enhance the value of gas-works; but a little consideration will determine that this is the case. The reduction of gas used for lighting through the adoption of incandescent burners, the increased use of gas-cookers, engines, &c., and the use of the electric light, have all tended to equalize the gas consumption during the summer and winter periods, with corresponding benefits to the capital value. It is obvious that the utilization of a larger proportion of the works during the summer months enables more gas to be issued annually with the same plant than was possible formerly, thereby reducing the capital expenditure necessary.

In order to show partially the extent of the enhanced value, the comparison of the ratio of the maximum daily output to the annual output must be ascertained. As an illustration, it may be mentioned that at Huddersfield, in the year 1892, this ratio was 1 to 148; whereas ten years later (1902) it was 1 to 198—this difference representing 25 per cent. reduced maximum capacity as being necessary. A more reliable comparison, however, is the ratio of the maximum weekly output to the yearly output. At these works, in the year 1892 this was 1 to 27; while in the year 1902 it was 1 to 33, which, upon this basis, represents only 18 per cent. reduced maximum manufacturing capacity as being necessary. Numerous comparisons might be made to still further emphasize this point.

The oldest issue of "Field's Analysis" available to the author at the moment is for the year 1896; and the ratio of the maximum daily to the yearly output shows for the Corporations named 1 to 164, and for the Companies 1 to 184. According to the last published "Field's Analysis" (year 1902), the average of the Corporations is 1 to 193, and of the Companies 1 to 210. The Corporations' undertakings are therefore 15 per cent. and the Companies' 12 per cent. more valuable for the purposes of manufacture than six years before. These figures, too, show that the Companies foster and encourage the sale of gas more than Corporations do; while they indirectly indicate the value of the sliding-scale clauses. It is satisfactory for the authorities in connection with gas undertakings to notice that this improvement in the value of their works continues. It is manifestly difficult to make a comparison with many undertakings, on account of the absence of official returns relating to the maximum daily and the maximum weekly output. These two items would form an interesting and valuable addition to the Board of Trade returns.

The value of gas-cookers for increasing the summer consumption is becoming generally recognized. In this town, the gas-cooker business during the past few years has been enormously extended, with beneficial results; and this, too, concurrently with a slightly reduced population, as shown by the last census. In the two centre months of the year (June and July) 1902, the gas sent out was 58·29 per cent. more than in the corresponding months for ten years previously; while the six summer months show an increase in the ten years of 40 per cent., thereby fully demonstrating the value of gas-cookers in equalizing the consumption of gas.

In estimating the extension of works, it is insufficient to take as the basis merely the actual increased annual output. The ratio of the maximum weekly to the annual output should also be considered, and is, indeed, an increasingly important factor in the calculation. The same consideration holds good in designing new works, as the effect of the ratio of the maximum weekly to the annual consumption is the same. It is quite possible for the actual annual output of a works to be increased under the altered conditions obtaining, without any necessity for increasing the maximum capacity of the works. It is conspicuous that this maximum weekly ratio to the annual output is in many cases ignored altogether in the calculations for extensions of works. Over and over again the calculations for extensions are based simply upon the maximum annual output, which, as shown, is insufficient. The reduction of capital expenditure is an all-important consideration to gas undertakings. In valuations for the purchase of gas-works, the ratio of the maximum daily and weekly output to the annual output should be provided for.

It is apparent, when comparing the capital per ton of coal carbonized at different works, that one common basis of comparison should be adopted. To compare an undertaking selling 8500 cubic feet per ton of coal carbonized, at (say) £6 per ton, with another undertaking selling 10,000 cubic feet per ton, would by itself be incorrect. In the former case, about 17 per cent. should be added to the capital account, making about £7 per ton of coal as the figure for comparison, instead of the £6. Sometimes an undertaking finds it advantageous, through the fluctuation of the coal market, to purchase a poorer class of coal, and regardless of this, at the end of the year deduces how remarkably the capital per ton has been reduced. This, to the uninitiated, presents a fictitious improvement, which it is well to guard against. If the capital per thousand cubic feet of gas per ton is taken as the basis for comparison, any element of error is avoided.

OBITUARY.

It is with deep regret, which we are sure will be shared by a large number of our readers, that we announce that Professor Vivian B. Lewes has just sustained a severe bereavement by the death of his wife. The sad event occurred at his residence, Downham Cottage, Wraysbury, on the 15th inst. The funeral took place at Wraysbury yesterday afternoon.

We regret to announce the death, on Monday last week, at his residence in Guildford, of Mr. William Longworth, Assoc. M.Inst.C.E., F.S.A., who for seventeen years was Secretary and Manager of the Guildford Gas Company, having previously filled a similar position at Dukinfield. He relinquished the management at the first-named place some years ago, and was succeeded by Mr. E. J. Lloyd, of Bristol. He joined the British Association of Gas Managers in 1864, and remained with it as the Gas Institute, discharging the duties of Honorary Secretary for two years in a critical period of its history. He was also a member of the Manchester District Institution of Gas Engineers, of which he was for a time Honorary Secretary; and he in due course rose to the position of President. As a mark of respect, about forty of the employees of the Guildford Gas Company, accompanied by the Secretary (Mr. W. Titley) and the Manager (Mr. G. R. Love), followed the remains of the deceased from his residence to the railway station *en route* for Middleton, where the interment took place on Saturday, in the presence of several of his old friends in the Manchester district. Mr. Longworth was 63 years of age, and had for some time been in failing health.

The gas industry of America has just lost one of its most distinguished members by the death, on Sunday, the 12th inst. (as the result of an operation for appendicitis), of Mr. Eugene Vanderpool, of Newark, New Jersey, of the Gas Company in which city he was formerly President and Engineer. Deceased was widely known in his own country, and he had a number of friends in this, as he was a not unfrequent visitor to Europe. Mr. Vanderpool may be said to have been connected with the American Gaslight Association from its foundation, having been elected in 1873. In 1885, he presided at the thirteenth annual meeting, which was held at Cincinnati, when the members of the Association—who had among them a visitor from England in the person of the late Mr. R. P. Spice—received a genial welcome from General Hickenlooper. Mr. Vanderpool delivered on that occasion a very thoughtful and suggestive address, the most important subject in which was the relation of American gas companies to the local authorities, in view of the pressure of competition of parties interested in water gas. Our contemporary the "American Gaslight Journal" characterized the address as "able, impartial, and scholarly," and went so far as to say that no other man in the country had given more thought and attention to the subject of the relations existing between municipalities and gas corporations than its author. Mr. Vanderpool was also President of the Society of Gas Lighting. A friend writing of him says he was "one the finest and most distinguished personalities in our industry;" and we can bear personal testimony to the justness of the appreciation. Apart from his ability as a gas engineer, he was a man who attracted friends by his wide sympathies; and at the time of his death he was the President and guiding spirit of the Howard Savings Bank, the greatest institution of the kind in New Jersey. We are sure that many regrets will be expressed on both sides of the Atlantic at the removal, at the comparatively early age of 58, of one who found much scope for the exercise of the special qualities with which he had been endowed.

TECHNICAL RECORD.

PROCEEDINGS AT THE GERMAN ASSOCIATION MEETING AT ZURICH.

The brief account given in the "JOURNAL" for the 30th ult. (p. 966) of the proceedings at the annual general meeting of the German Association of Gas and Water Works Engineers on the 24th to the 26th of June may appropriately be supplemented by fuller particulars as to some of the more important technical communications.

THE WATER POWER OF SWITZERLAND.

The distinguished Swiss engineer and politician, Professor C. Zschokke, of Aarau, quite properly was given precedence over the other authors of papers; and the technical proceedings of the meeting began with his lecture on the "Utilization of the Water Power of Switzerland." The subject was one with which, in virtue of both his engineering experience and his position as President of the National Council of Switzerland, he was eminently qualified to deal in an authoritative manner. But readers of the "JOURNAL" are not directly interested in the matter; and we shall therefore only briefly outline the treatment accorded it by the Professor, while endeavouring to bring into prominence the points of general rather than local economical significance. The address was fully reported in the newspapers throughout Switzerland and attracted much attention.

Switzerland is a land of mountains, devoid of coal and other mineral resources, and with a poor soil and climate for agricultural pursuits in comparison with neighbouring lands. Its population of nearly 3½ millions cannot subsist on the profits of agriculture; and its industries are dependent on competing nations for fuel for the development of power. Briquette fuel is largely used, and is imported along with coal mainly from Germany. Professor Zschokke, mindful of the nationality of the bulk of his audience, did not mention the fact that the Swiss in reality find the yoke of the German coal and briquette factors very irksome, and that they are eagerly seeking for some way of escape from under it. The feeling has become intensified recently, because the briquette makers have been impelled by the high price of pitch to economize in their consumption of that material; and much of their output as imported into Switzerland has suffered accordingly. If there were but an easy means of bringing English coal into Switzerland, relatively higher prices would gladly be paid for it by those who have experienced the ills of the virtual monopoly now held by Germany. But Switzerland has no seaboard; and Genoa, which might do a prosperous business in transporting sea-borne coal, &c., to Switzerland, is possessed by a shiftless and untrustworthy race, and is to all intents and purposes useless in this direction. Oil might be brought into Switzerland by the same route for use as fuel, but for the well-nigh insuperable barrier imposed by Italian shiftlessness. So there is nought for it but to keep a rigid check on the quality of the imports from Germany, and to develop the natural resources of Switzerland in respect of water power.

The extent of these resources may be grasped from considerations which were set forth at length by Professor Zschokke. The 300 Swiss meteorological stations have collected statistics of rainfall for the past thirty years, and by codifying these the country has been portioned out into a number of zones within which the average annual rainfall is approximately the same. It appears that the smallest rainfall is found generally in the lowest districts, and the highest on the lofty mountains. The fall in an average year in the Jura district amounts to 39½ inches; and in the higher districts to twice as much. It has been calculated that the average amount of water which falls in Switzerland is about 360,000 gallons per second. Bearing in mind that the ordinary Swiss plateau stands 1300 feet above sea level, and that the higher districts rise to about 4000 feet, it will be seen that this quantity of water represents a very large store of power. It has been utilized to a limited extent, and by primitive means, for many years past. Schemes for the distribution of hydraulic power were tried near Zurich; but the great advance came when the water power began to be utilized for the production of electrical energy.

The capital required for the development of schemes for this purpose was soon forthcoming, and many water-works were then constructed. The great difficulty lay in being able to get out the required power under even small variations of the water level. This is partly overcome by the use of large storage reservoirs, of which the large Swiss lakes present natural examples. But even with the largest water-power works, the fluctuations of level are troublesome, and entail much expenditure. Where the rights of other parties were not thereby interfered with, dams adequate to maintain a constant level for two days have been successfully employed. But in other cases, recourse has had to be had to auxiliary steam power, in order not to be tied down during the greater part of the year to utilizing only a small portion of the available water power. A further question which arises is the equalization of the small or day fluctuations in consumption. In any case the cost of an installation must vary greatly and must be dependent on the local conditions. But, speaking generally, it might be said that the value of a horse power varied between £12 and £36, averaging about £20, or, with all charges, about £28. That is to say, alternating current would cost about 0·625d. per Board of Trade Unit, and direct current 0·864d. per unit. Assuming 3000 working hours per annum, and a constant large demand, alternating current should not cost more than £4 per kilowatt per annum.

The water-power works in Switzerland are now owned by the cantons, and nowhere by private concerns. Various estimates have been made of the water power which might be made available in the country; but one of the most recent, by Jegher, puts it at 154,000-horse power. But according to statistics collected by Professor Zschokke from the authorities of the cantons, there are already utilized 279,800-horse power, of which 161,800 is for the production of electrical energy. Many small works are not included in these figures. Further, the investigations of the Swiss Hydrometric Department have established the fact that only about one-third of the available water power of the country is at present utilized. Consequently, there is still over 500,000 horse-power awaiting application. The department is classifying this available water power according to the ease with which it may be utilized. It will readily be realized how great a source of national wealth this power constitutes to a small country which is devoid of coal.

The theme chosen by Professor Zschokke, and his skilful treatment of it, were highly appreciated by his audience; and his subject matter, briefly epitomized above, is worth pondering even by English engineers who have never to look further than our rich coal supplies for their source of power. The manner in which the Swiss Government is applying itself to the economical utilization of water power wherever available is an instructive lesson, and helps to explain the immense advances which recent years have witnessed in Swiss industries in face of the keen competition of Germany and other adjoining countries. Some of the engineering works around Zurich can teach many a good lesson to the best engineers of other lands.

THE ECONOMICAL VALUE OF GAS COALS.

After Professor Zschokke's address, the Gas, Water, and Electricity Works of Zurich were described by their respective Managers, as already mentioned; and then Herr Wunder, of Leipsic, and Professor Bunte, of Carlsruhe, gave addresses on the "Economical Value of Gas Coals." Some particulars of these may appropriately be given here.

Herr Wunder spoke from the standpoint of the practical man, and said that our knowledge of the economical or industrial values of gas coals was still very deficient. There certainly existed defining points for the economical valuation of these coals; but they were defective, and very little was known scientifically as to their value. He had made experiments which indicated that if the economical value of Westphalian coal for gas making was taken at 100, the corresponding value for Saar coal was 100, that for Zwickau coal 90, for the primary coal of the Plauen basin in Saxony 75, for upper Silesian lump coal 130, and for lower Silesian rough pit coal 100. Various factors had to be taken into account in valuing gas coals; such as the ease with which they were carbonized, the quality of the gas, the quality of the coke, yield of ammonia, &c. Earlier endeavours at establishing values for gas coals had proved to be insufficient, though it was a matter of extreme importance in gas manufacture that the relative values of different varieties of coal should be settled. He therefore concluded by proposing that the meeting should decide to instruct the Committee of the Association to take up the question of the economical value of gas coals, and to adopt the necessary measures for accomplishing this object.

Professor Bunte dealt with the question at greater length than Herr Wunder, and from the standpoint of the scientific investigator rather than the practical user of gas coals. He pointed out that though our knowledge of the calorific values of coals, and of the methods of determining calorific power, was, comparatively speaking, in an advanced stage, yet even now coal was scarcely ever bought and sold on the basis of its calorific power. Still less was gas coal valued according to any definite tests of its comparative intrinsic worth for carbonizing; and there was not even any generally accepted procedure for the laboratory determination of the economical value of gas coals. We are not indeed at present in a position to form an exhaustive judgment of the value of a gas coal. But this need not be regarded as a severe reproach of our mode of working, because gas making and the carbonization of coal were extremely complex processes, of which it was very difficult to arrive at any clear understanding. Our knowledge of the intrinsic worth of coal for any purpose, so far as laboratory investigation went, did not extend much further than a determination of calorific power. It appeared, however, from the most thorough researches made up to the present time, that a chemical examination of coal could not *per se* give a fully satisfactory answer as to its value; but it was worth while considering carefully the comparative results of such an examination for a number of typical gas coals, with a view to seeing to what extent useful and trustworthy information could be gathered therefrom. The following table showed the composition of four varieties of coal, as won, during the years 1888 and 1903, and indicated that the pits were now yielding substantially the same coal as fifteen years ago.

Percentage Composition of the Rough Coal.

Description of Coal.	Year.	Ash.	Moisture.	Coal Substance. Total.	Percentage Composition. Carbon.	Hydrogen.	Oxygen, Sulphur, and Nitrogen.
Luise	1888	3·9	2·2	93·9	85·0	5·2	9 8
,,	1903	3·5	2·2	94·3	84 9	5·0	10·1
Ewald	1888	6·7	2·8	91·5	85·6	5·6	8·8
,,	1903	6·5	1·8	91·7	83·6	5·5	10·9
Bockwa-Hohndorf	1888	3·5	8 6	87·9	83·6	5 4	11·0
,,	1903	3·7	6·5	89·8	82·2	5·6	12·2
Zwickau, Bürgerwerkshaft	1888	7·5	7·8	84·7	81·2	5·8	13·0
	1903	8·2	6·5	85·3	81·4	5·8	12·8

The crucial point in determining the relative values of gas coals was, however, their behaviour on being carbonized; and many factors, and pre-eminently the temperature of the retorts, had very great influence on this behaviour. The temperature of carbonization was almost as important as the nature of the coal in determining the quantity and quality of the gas obtained, and its illuminating power and heating value. In this connection, the following table of the average results of carbonizing well-known classes of German coals is instructive.

Carbonization Results.

Class of Coal.	Gas Yield per Ton. Cubic Feet.	Illuminating Power of Gas. (Consumed at Rate of 5·3 cb. ft. per Hour in Elster Argand.) English Candles.	Temperature of Carbonization (about) C.	Products obtained in percentages by weight of coal carbonized. Coke.	Tar.	Liquor	Gas.	Loss
Westphalian	10,872	14·14	1270°	71·40	4·09	4·44	16·95	3·12
Saar	10,837	12·98	1250°	68·30	5·33	6·90	17·71	1·76
Bohemian Black Coal	10,227	12·88	1250°	63·30	5·79	9·06	18·52	3·33
Zwickau	9,150	12·93	1210°	62·70	5·22	11 89	15·81	4·38
Platten	10,909	22·96	1270°	56·30	8·81	6·45	25·72	2·72

The illuminating power of gas, however, as shown in the foregoing table, was only of significance in respect of argand and flat-flame burners, and therefore had now become practically useless as a criterion of the value of the gas derived from a coal. The calorific power of the gas played so important a part in incandescent lighting that it was now right to regard it, rather than illuminating power, as a measure of the quality of gas. The following particulars with regard to the disposition of the calorific power of two different kinds of coal when carbonized were instructive, as showing to some extent the relative values of the coals for gas making, &c.

The first was a good German gas coal of old formation; the second a recent coal. Now for every 100 parts of the first coal as wrought, there were contained in it 94 parts of true coal, and 3·45 parts of ash; and in the second, 83 parts of true coal and 9·18 parts of ash. One ton of the true coal yielded 11,840 cubic feet of gas; hence the first coal yielded 11,125 cubic feet per ton, and the second 9150 cubic feet, or 18 per cent. less than the first. The proportional yields of coke were 70·85 parts for the first, with 4·8 per cent. of ash, and 58·4 parts for the second, with 15·7 per cent. of ash. The calorific power of the coke from the first coal was 7616 calories per kilogramme, or 13,705 B.T.U. per pound, and from the second coal 6644 calories per kilogramme, or 11,958 B.T.U. per pound. Hence if with the first coal, 15 lbs. of its coke were required to heat the retort-settings per 100 lbs. of coal carbonized, there would be required for the same purpose 17·2 lbs. of the coke from the second coal. This would bring down the proportional net yields of coke to 55·85 parts of the first, and 41·2 parts for the second coal. That is to say, the saleable coke from the second coal would amount to 73·7 per cent. of the saleable coke from the first coal, and its aggregate heating power to only 64 per cent. of the aggregate heating power of the latter.

Some other figures relating to different varieties of German coal were quoted by Professor Bunte; but *per se* they are not of special interest to English gas engineers. He thought that it would be only a question of time before coal for heating purposes would be bought according to its calorific power, and coal for gas making according to its "gas value." He gave his support to the proposal of Herr Wunder, which was then put to the meeting, and unanimously agreed to.

The next papers dealt with were those by Messrs. Körting and Drory, on the "New Gas-Works of the Imperial Continental Gas Association at Mariendorf, Berlin," and by Herr E. Salzenburg, on "The Reconstruction of the Crefeld Gas-Works." These papers were to a considerable extent antithetical to one another and as an account of the Mariendorf Gas-Works has already appeared in the "JOURNAL,"* we shall give Herr Salzenburg's paper precedence by reproducing the substance of it, and shall subsequently revert to the Mariendorf works.

* See "JOURNAL," Vol. LXXIX., p. 1483.

WATER GAS MANUFACTURE BY THE KRAMERS AND AARTS PROCESS.

The following is an abstract translation of a paper on "Water Gas Manufacture with Special Reference to the Process devised by Drs. Kramers and Aarts," read by Dr. Alph. Steger, of Amsterdam, at the recent meeting of the German and Swiss Associations of Gas and Water Engineers at Zurich. It will be remembered that a valuable series of articles on "Water Gas Manufacture" by Dr. Kramers, one of the inventors of the process, was published in Vol. LXXIX. of the "JOURNAL."

Until recently water gas manufacture was virtually restricted to the United States of America and England; but now its good qualities have attracted the attention of gas men in other countries —notably in Germany and Austria. Distinction must be drawn, however, between the oil-carburetted water gas of the first period and the simple or "blue" water gas now coming to the front. Changed conditions are responsible for the advent of the latter. The supersession of the flat-flame by the incandescent burner for lighting purposes has rendered it no longer necessary to provide gas of high illuminating power, or even of high calorific value, provided it affords a high flame temperature. Simple water gas has a very hot zone of combustion; and hence it is taking a prominent position in the lighting world. Moreover, gas rendered illuminating by means of oil vapours is not so acceptable to technical men as a simple gas, which affords a high temperature, for welding, soldering, forging, &c. Nevertheless, carburetted water gas would probably continue to compete with simple water gas but for the advantages offered by the quite recent idea of introducing water gas into the retorts during the production of coal gas, and thereby forming a mixed gas not very dissimilar in properties to coal gas itself. The results of trials of this process* have shown that it presents great advantages, and that, consequently, the manufacture of simple water gas is now of greater importance than that of carburetted water gas.

Two fundamentally different modes of producing simple water gas have to be considered—viz., the continuous and the intermittent. Steam is passed through a layer of incandescent fuel in both; but the heat required to maintain the water-gas reaction [$C + H_2O = CO + H_2$], is supplied either continuously or from time to time by the cessation of the steam admission and the application of an air blast to the fire. According to Lang, the reaction $C + 2H_2O = CO_2 + 2H_2$ begins to take place at a temperature of 100°C., and only gives place entirely to the aforementioned water-gas reaction about 1000°C.

Hence it is necessary to maintain the fuel at about the latter temperature; and clearly the continuous supply of heat to the fuel would present manifest advantages, in that the latter would be kept at a constant temperature, and the gas made would therefore be of uniform composition, while the wholly unavoidable losses of heat would be kept as low as possible. There are three ways in which the continuous system might be carried out in practice—viz.: (1) By external heating to restore to the fuel the heat abstracted from it through the formation of water gas. (2) By prior superheating of the steam to such an extent that its sensible heat balances the heat of decomposition. (3) By the admixture of neat oxygen with the steam.

The first of these methods entails heating the generating vessel just as coal gas retorts are heated, but maintaining a higher temperature than the 800° C. or thereabouts of the latter, and that in face of the considerable absorption of heat by the water gas reaction. Coal gas production, on the other hand, entails little or no such absorption of heat. This method could only be worth pursuing if a material were available for the retorts which was a good conductor of heat and capable of withstanding high temperatures and highly superheated steam. In the absence of such a material, the method must be considered impracticable.

The second way in which the continuous method might be carried out has often been named in patent specifications. But theoretical considerations show that, in fact, it cannot be successfully followed in practice. Assuming that the fuel in the generator is at 1000° C., that the water gas leaves the apparatus at 500° C., the water gas reaction requires about 18,000 calories. (The method of calculating this figure has been given by Dr. Kramers in his articles on "Water Gas Manufacture in Theory and Practice."†) To bring this heat to the fuel through the steam requires the latter to be heated to about 2200° C. (taking Le Chatelier's formula $7{\cdot}56 + 0{\cdot}0065\,t$. for the molecular specific heat of steam under constant pressure). Apart from the dissociation of the steam and the formation of explosive gas which would occur to a considerable extent at this temperature, the practical difficulties in the way of heating steam to such a degree are manifestly insuperable. Indeed, the transference of large quantities of heat by means of steam or gases is in all cases a very difficult problem. It may be further discussed here because it has recently been proposed to apply the waste heat of fuel gas as made to produce the steam required for gas making.

Now, if the fuel gas contains (say) 18 per cent. of hydrogen, about 207,000 calories will be required to make the necessary

* See "JOURNAL," Vol. LXXXII., pp. 446, 668, 670.

† See "JOURNAL," Vol. LXXIX., pp. 1350, 1416, 1495, 1565, 1781.

steam. The temperature of the escaping gas from the generator may be taken at about 400° C.; and from the steam producer or boiler under the most favourable conditions, at 100° C. Consequently, the hot gas (taking its specific heat at 0·8) would only give up about 204,000 calories per 100 cubic metres, or 3000 calories less than is required to produce the steam. Practically, however, the duty would be still less, because of radiation. Moreover, even if the waste heat of the gases sufficed to produce the steam, difficulties would occur owing to the greater heat in the generator causing disintegration of the fire-bricks, melting down of the grate, &c. It is even worse if the attempt is made to heat up at the same time the air used in producing fuel gas, as to heat this to 100° C. would require a further 3000 calories—making a deficiency in all of 6000 calories. The same objections apply also if the steam and air are introduced alternately to the generator, instead of simultaneously, and the attempt is made to utilize the waste heat of the escaping water gas and producer gas to produce the steam or preheat the air supply.

Passing on to the third way in which the continuous method of water gas production can be carried out—viz., by mixing oxygen with the steam—the product will no longer be water gas proper, but a mixture of about 70 per cent. of carbonic oxide with about 30 per cent. of hydrogen. Apart from hygienic objections, the mixture would be an equally good fuel gas, and would more nearly approach the ideal gas (carbonic oxide only) for raising mantles to incandescence. This method does not present technical difficulties, and could doubtless be followed. But it would be too costly at prevailing prices for oxygen, except on a laboratory scale. The conclusion, therefore, is that the continuous method of making water gas is either impracticable or too costly.

The intermittent process for making water gas involves the actions of heating up and cooling off of the fire taking place one after the other instead of simultaneously. The temperature in the generator having been brought high enough, steam is injected, and the water gas produced is led away until the temperature has fallen so low that the production of true water gas begins to cease, whereupon the inflow of steam is interrupted and the fire is blown-up afresh. The intermittent character of the process appears to entail great losses of heat; and there is no question that they are greater than when neat oxygen is used for the continuous production of a kind of water gas. But if the intermittent process is properly conducted, very little heat escapes utilization.

It will be convenient at this stage to consider the most advantageous manner of blowing-up the fire. The combustion of a molecular quantity of carbon to carbonic oxide liberates 29,400 calories; while the combustion to carbonic acid liberates 97,600 calories. It is therefore advantageous to form as little carbonic oxide as may be; and practice teaches that (1) combustion takes place almost solely with the formation of carbonic acid at low temperatures, while the chimney gases are richer in carbonic oxide as the temperature rises; (2) the proportion of carbonic oxide at a particular temperature is dependent on the depth of the bed of fuel; and (3) the proportion of carbonic oxide is dependent on the rate of flow of the air for the same temperature and the same depth of fuel bed.

It may be deduced from these observations that carbonic acid is first formed, and is reduced at a sufficiently high temperature to carbonic oxide. This reduction must be as far as possible prevented, in order to secure a proper heating-up of the fuel; and it follows from the foregoing that three means are available for this purpose—viz. (1) Maintaining the fuel at a low temperature, (2) having a high rate of flow of the air, and (3) having a shallow bed of fuel. Obviously the first means is not of service, because the water-gas reaction demands a high temperature. The shallow bed of fuel undoubtedly gives an economical result from the blow; but it does not admit of the steam flow being adequately large during the gas making, because steam would pass through undecomposed. A very powerful blast is therefore the only means available. But even with it some carbonic oxide will be formed, because at a given temperature the speed of reduction of the carbonic acid will have become greater than any velocity of the air blast; and, naturally, the deeper the bed of fuel, and consequently the longer the period of contact of the carbonic acid with the fuel, the more will be the amount of carbonic oxide formed. The only resource is therefore to burn the carbonic oxide formed by a subsequent supply of secondary air, and to store up the heat thus liberated in a manner in which it can be used during the next period of gas making. Further, however, the ideal conditions of blowing-up the fire require the sensible heat of the flue gases formed to be turned to good purpose, as well as the heat of combustion of the carbonic oxide. This cannot be completely achieved, but should be aimed at. The ideal conditions for the "blow" having been taken into account, the most efficient way of conducting the "run" or gas making must be ascertained.

Now, assuming that steam is injected beneath a coke fire in the generator, the products are either carbonic acid and hydrogen or carbonic oxide and hydrogen, according to the temperature. At 600°C., they are almost exclusively the first; but as the temperature becomes higher, the proportion of carbonic acid gradually diminishes and that of carbonic oxide rises, until, at about 1100°C., the products are almost solely carbonic oxide and hydrogen. But even if a sufficiently high temperature is maintained in the generator to ensure the reaction being $C + H_2O = CO + H_2$, nevertheless some carbonic acid will result if undecomposed steam passes through the fire, owing to steam and carbonic oxide reacting at temperatures above 600°C. to form hydrogen and carbonic acid. But while as a fact it is difficult wholly to avoid the passage of undecomposed steam through the fire, especially if the fuel bed is shallow, it is bad not merely because it conduces to the formation of carbonic acid, but also because it is costly, and withdraws heat from the generator—the specific heat of steam at the high temperature of the generator being nearly double what it is at ordinary temperatures.

If the rate of flow of the steam is kept low, the evil named is avoided. But the capacity of the apparatus is limited. Consequently, the only course is to let the carbonic acid be formed and the steam pass through, and subsequently to remove the one and utilize the other in some other way. There are many ways of removing the carbonic acid; but they are all costly. Another fact to be remembered is that while it has hitherto usually been the custom to employ coke which has been produced in coal gas manufacture for making water gas, it may be more advantageous under many circumstances to use other local fuel, conditionally on the layer in the generator being so shallow that it does not become unusable by reason of clinker.

The conditions which must be observed in the intermittent process of water-gas manufacture, in order to secure as large a yield and as economical a procedure as possible, have now been indicated; and it only remains to refer to one of the most recent types of plant in the construction of which these conditions have been kept in mind. It comprises two pairs of generators, with, for choice, also a recuperator for preheating the air for each pair. The two recuperators always communicate with one another by means of a connection; while each is connected at the top with the corresponding generator. The generators are lined in the usual manner, and present as large reacting surfaces as possible. They discharge into a common recuperator, which serves alternately for cooling the spent gases and preheating the air supply. The air-main from the recuperator branches to the generators, and supplies the primary air to the lower and the secondary air to the upper of the two vessels. The steam for gas making enters below the fire in the two generators, and at top and bottom of the recuperators. The gas exit pipes pass beneath the grates into a collecting main, which takes the gas to the condensing apparatus. The connections between the generators and the recuperator and the gas outlet pipes can, of course, be shut off by valves, which are all controlled from one point.

For a "blow," the air inlet to the generator and the connection with the recuperator are opened. The cold air enters the recuperator and is warmed by passing through it in the opposite direction to that taken by the hot spent gases. The heated air then flows into the generators. As the depth of the fuel is very shallow—only 2 ft. 3½ in. in an experimental apparatus for an output of 4400 cubic feet per hour—the combustion mainly results, if the blast is properly regulated, in the formation of carbonic acid. Owing to the high temperature of the fuel, however, there is always partial reduction to carbonic oxide; but the latter is burnt by means of a secondary supply of air, and the heat thus liberated, together with the sensible heat of the flue gases, is stored in the recuperator and given up later to the air supply. Owing to the small depth of the fuel bed, however, there will not be much carbonic oxide to be burnt, and the quantity of heat stored in the recuperators will not be unduly great, though with proper construction a high temperature may be attained.

The heat from the "blows" is thus utilized as economically as possible in the apparatus; for, in the first place, complete combustion is accomplished mainly in the fire itself, and, in the second place, nearly all the heat of combustion of the carbonic oxide formed by reduction is taken up in the apparatus.

At the end of a "blow," the recuperator and air-valves are shut, and steam is injected at the bottom of the first generator, and into the two recuperators; while the gas connection from the second generator is opened. Water gas is produced in the first generator, and with some carbonic acid and undecomposed steam, passes into the recuperators, where the introduced steam reacts with the carbonic oxide in the water gas and forms carbonic acid and hydrogen. If the process stopped here, the product would naturally be a very inferior one; but the mixture passes on to the second generator, and the carbonic acid is there completely reduced. This procedure is best in regard to the quality of the gas made, because the steam, entering the first generator, comes finally in the second generator in contact with the hottest parts of the fire, and, consequently, the decomposition of the carbonic acid takes place so energetically that tests show that it is absent from the water gas made during the first half of the "run" or make of gas. The whole of the component parts of the plant are cooling while gas is being made—*i.e.*, the first generator is cooled by the formation of water gas, the recuperators by the incoming steam and its decomposition, and the second generator by the reduction of the carbonic acid. Thus the whole system is ready to take up heat during the ensuing "blow." The arrangement presents the important advantage that the second generator is cooled less, and therefore the better effects its work as a reducing chamber; while, when the blow takes place, it becomes far the hottest, and is therefore best adapted to serve as the water-gas producing chamber during the next "run." So, in two successive runs, the parts played by the two generators are exchanged.

During the "blows" the two generators are used in parallel, and during the "runs" in series. The alternating course of the gas through them presents a further advantage in preventing the formation of troublesome clinker. The low depth of the fuel bed admits of the "blows" being made extremely short, and also gives the advantage that bad or even caking coal may be used in the generators. The disadvantage presented by the shallowness of the bed—viz., that steam passes through it undecomposed, thus abstracting much heat from the fire, and either condensing as such or increasing the proportion of carbonic acid in the gas—is done away with in this plant, because the steam and carbonic acid are brought into contact with incandescent fuel in a reducing chamber before reaching the outlet of the apparatus. The amount of steam admitted, and, consequently, the capacity and adaptability to demands of the plant, may be varied considerably at will without the composition of the gas or the amount of steam used being greatly affected.

The use of tar-producing fuels is either out of the question in other systems of water gas manufacture, or entails the employment of tar extractors, &c., as in the case of carburetted water gas plant. But the present system allows such fuels to be used merely on condition that they are introduced before a run into the generator which is about to serve as the first in the series. The hot water gas then distils the fuel, and the products pass into the recuperators, where they are fixed or react with steam. When the apparatus is used in this manner, it is a good thing to admit steam to the upper part of the generator where the fuel is being distilled. The last trace of tar, &c., will in any case be destroyed in the second generator.

The advantages of the process referred to are, briefly, that, during the "blow" when the generators work in parallel, the fuel bed is shallow, and, consequently, yields mainly carbonic acid and is rapidly heated up, any carbonic oxide formed is burnt and the heat stored up, and the air for the blast is preheated; while during the "run," when the generators work in series, undecomposed steam from the generator is utilized for reacting with carbonic oxide in the recuperators to form carbonic acid, which is subsequently reduced in the second generator. The recuperators are thus cooled, the steam and gases are brought in contact with the hottest part of the fire, the direction of flow is reversed after each run, and the rate of flow of the steam may be varied within wide limits to suit the desired output. Further, gas coal may be used in the apparatus without risk of tar being produced; and inferior and caking fuel may also be used.

An experimental plant, capable of making 4400 cubic feet per hour, has been worked at Dongen, in Holland. In addition to the apparatus with boiler, blower, and gas-engine, there were also a scrubber, a relief gasholder, a purifier, a gas-meter, and a large holder. The trials were made with this plant at first under the observation of a certifying Committee, consisting of Professor H. W. Bakhuis Rooneboom, of Amsterdam, Heer J. Blom, the Manager of the Haarlem Gas-Works, and the author. The results were, however, so remarkable that Heer D. van der Horst, the General Manager of the Amsterdam Gas-Works, after visiting the plant decided to send the Chemist with his Assistants from those works to study a fourteen days' run with the plant. The appended figures are taken from his report.

The temperatures determined with the pyrometer were: The generators, after blowing, about 800°C.; the flue gases at the outlet of the recuperator, average, 250°C.; the gases escaping from the second generator, 500°C.; and the air for the blast at the inlet to the generator, 170°C. There were produced 5160 cubic feet of gas per hour from about 117 lbs. of coal consumed in the generator, or the consumption per 1000 cubic feet of gas made was 22·7 lbs. of coal, containing 18·95 lbs. of carbon. The calorific power of the gas was 2871 calories gross, or 2626 calories net per cubic metre (322 B.T.U. gross or 295 B.T.U. net per cubic foot). The average composition of the gas was—

Carbonic acid	1·1	volumes per cent.
Carbonic oxide	43·2	,,
Hydrogen	49·0	,,
Marsh gas	1·0	,,
Nitrogen	5·4	,,
Oxygen	0·3	,,

The steam used for gas making amounted to 37½ lbs. per 1000 cubic feet of gas made. Coal was employed instead of coke in order to test the value of the fixing process. No tar was deposited either in the collecting main or purifying vessel.

A brisk discussion followed the announcement of these results, and an esteemed English opponent said that in the first place the trial was only a laboratory experiment, and in the second place that the calorific output of the system was, according to the figures, over 100 per cent. As to the first contention, while a 4400 cubic feet per hour apparatus is not indeed a large one, it is large enough to give trustworthy figures. The second contention was based on a calculation of the heat-balance, which ignored the hydrogen in the coal—amounting in this instance to 4·5 per cent.—and the steam produced outside the generator. A sound calculation of the heat balance would be—

1 lb. of coal, having a calorific power of	14,760	B.T.U.
and 1·53 lbs. of steam at 150°C. =	1,795	,,
Giving therefore a total value of	16,555	,,
Yield slightly over 44 cubic feet of water gas of a calorific power of 322½ B.T.U. per cubic foot =	14,155	,,
Making the loss =	2,400	,,

Consequently, the efficiency of the apparatus is

$$\frac{14{,}155 \times 100}{16{,}555} = 85{\cdot}5 \text{ per cent.}$$

This extremely high efficiency is to be ascribed to: (1) Th advantages of the system as already indicated; and (2) the fac that the spent gases remaining in the recuperators also pass into the gasholder after the blows—the carbonic acid in them being reduced to carbonic oxide in the second fire.

WESTERN (U.S.A.) GAS ASSOCIATION.

Annual Meeting at Louisville.

The Twenty-sixth Annual Meeting of the Association was held on May 20, 21, and 22. The President, Mr. A. H. Barret, of Louisville, occupied the chair. In the course of a few introductory remarks, he said that, owing to the thoroughness of research of his predecessors, little or nothing was left for him to say; nothing of striking interest having occurred since the last meeting. He therefore concluded that the best interests of the Association would be covered by spending the time usually occupied with the President's Address in listening to the papers and discussions. The Secretary and Treasurer, Mr. J. W. Dunbar, of New Albany, reported a total membership of 379, and a cash balance of over £108 in hand.

A High-Pressure Gas-Main.

Mr. Thos. D. Miller, of New Orleans, read a paper on the "High-Pressure Gas-Main across the Mississippi." This was a scheme arranged and carried out by Mr. F. H. Shelton. The author illustrated his remarks with photographs and plans. The width of the river at the point selected was over 2000 feet; and the depth varied to the extent of 20 feet between the lowest and highest level. When it was decided to carry a high-pressure main across the river, some of the old and experienced river engineers regarded it as impracticable, owing to the depth, the constantly shifting bed, the swift current in the main channel, and the presence of a great deal of wreckage. The course having been marked out by soundings, a large derrick boat, capable of lifting 75 tons on a straight pull, was engaged to drag the pipe across. The pipe used was the best Allison steel, 6 inch bore, with threads so designed that they did not reduce the substance of the pipe; and it was considered important that the whole of the threads should be entirely taken up. The threads had an extra taper; and the ends of the pipe were faced so as to set flush together. Each joint was well painted with asphaltum iron paint, and enclosed in a cast-steel split sleeve weighing about 300 lbs., held together by eight ⅝-inch bolts, which were split and riveted after screwing up. To commence, a length of 250 feet was made up; and at the water end, a solid stopper, coned to admit of clearing obstructions, and having an eye for the shackling of the hauling cable, was attached. The shore end of the pipe was tightly plugged. The best obtainable steel wire cable was used, 1 inch diameter for the lighter, and 1¼ inches for the heavier pulls. Additional lengths of pipe were screwed on as required. The total time occupied in dragging across and making joints was 32 working hours. At first, the pulling was easy; but as the work progressed, considerable obstruction was caused by the wreckage in the river. Gas was turned through the main last November; and it has continued in satisfactory operation, with no leakage of river water.

Discussion being invited, Mr. Shelton said that the entire cost of the pipe was about £2000, or £1 per foot. It was intended to supply a district known as Algiers, having a population of 15,000 to 20,000. The cost of a separate gas-works would not have been less than £6000. At present, the pipe was not worked to its full capacity; but when required, he expected to supply a million cubic feet per day through it. While laying the pipe, he thought it well to put down a 6-inch rather than a smaller size. With a low-pressure pipe, there might be difficulty from condensation; but with the high-pressure main, this did not occur. Not a drop of condensation had as yet been found in the pipe. Mr. Norris wanted to know if the pipe was fairly grounded all through, or did the current tend to drag it? Was there any tension on the shore ends? He would also like to know how far the pipe was out of the straight line down stream? He presumed arrangements had been made for getting rid of possible leakage or condensation, and would like some details of them. Perhaps the high pressure would drive the liquid before it. Mr. Goodnow raised the question of possible electrolytic action, and inquired if any arrangement for protection had been made. High-pressure distribution certainly did away with trouble from condensation or frost. The estimate of one million cubic feet was low, as near Chicago there was a 6-inch high-pressure line, six miles long, carrying 1,200,000 cubic feet per twenty-four hours, with an initial pressure 30 lbs. and a loss 8 lbs. Mr. Rice had put a lead pipe across a river 600 to 700 feet wide, and over 30 feet at the deepest part, and supplied gas at high pressure to a small holder. It had been in use for a year, with complete satisfaction—no trouble from condensation or leakage. The cost was about 1s. 8d. per foot. The pipe was put together by one plumber in twelve hours on a barge, care being taken to make the joints stronger than the body of the pipe. The barge was pulled across in half-an-hour.

Mr. Miller, in replying, mentioned that when the pipe was first

tried, one joint was found to be damaged at a point where there was an angle of over 30°. It was lifted and repaired, and the pipe bent by heat to, as nearly as possible, fit the angle. Tanks for condensation or leakage were provided on each side. The pressure would drive the water through, and also empty the tank when the outlet valve provided for the purpose was opened. No provision had been made against electrolysis, as there was no reason to expect such action. Nobody could say just how far the pipe had gone down stream; but it was pulled over at a great tension, and in some places was 5 or 6 feet above the bottom. The tension on the shore ends was practically nothing; the pipe having taken its bearings, and no doubt in time would be entirely bedded in silt.

Gas and Meters.

The above was the title of a paper read by Mr. John M'Ilhenny, of Philadelphia. To some extent, it was an historical reminiscence, as it went back to the times of Clayton and Murdoch. He remarked that gas-lighting was introduced in 1802 or 1803, so we were now about at the centenary; and he suggested that the event might be celebrated by a gathering of all the Associations in the States, at which each one could deliver its annual address, consisting of an historical account of the Association. The meter was a reliable measurer; but the difficulty was that the quantity consumed was not known till the quarterly bill was made out. This was now remedied by the successful introduction of the prepayment meter. Gas was really one of the cheapest things in a house. He had lately investigated 26,000 accounts, and found that over 2000 of them only averaged about 4d. per day—simply the price of a car fare or a cigar.

Captain White, in proposing a vote of thanks to the author, referred to the labours of the pioneers in the gas industry, and hoped that a history of the rise and progress of the industry in the States would be forthcoming. The suggestion as to a centenary was referred to the Committee on place of next meeting.

Pushing the Gas Business.

Mr. B. W. Perkins, of South Bend (Ind.), read a paper on "Increasing Sales to Existing Gas Consumers." Canvassing could be materially aided by a feeling of confidence in the company, the goodwill of the Municipal authorities and the public press, and by good advertising. Many people used gas for one purpose only—perhaps for lighting, cooking, or else heating; and there was no reason why the reliability, cheapness, and other advantages of gas should not be kept well before them until they adopted it for all purposes. People did not know how many useful purposes could be served by gas. He advocated letting high-power burners on hire and selling stoves, and in fact all kinds of appliances, by instalments. Personal visits to factories often brought out uses for gas that would not be otherwise thought of. Card indexes should be kept of every house along the lines of main, showing exactly how far gas had been adopted; the canvassers could thus ascertain what extent of ground remained to be worked.

Mr. Searle opened the discussion by relating an experience in one particular district where a notable increase in the consumption of gas was found to be due to the use of dark wall papers. In new houses, the walls were frequently left for twelve months before papering; and he found cases of rooms that were lighted by one burner while the walls were white, but after papering with the dark tapestry papers now in vogue, they required three. Mr. John D. M'Ilhenny directed special attention to the industrial uses of gas as a department that had been neglected. It was to a great extent summer and day business, and would pay for any reasonable arrangement as to appliances. He knew of several lines that had been developed by placing apparatus on approval terms. Mr. Shelton was impressed with the value of newspaper advertising, which he was applying in several towns with marked success. In one city, he ran a full or a half-page advertisement weekly; and the increase last year in the district was 79 per cent. He took engines one week, stoves the next, and so on; and the public looked for the gas item each week. He also found, when it was necessary to raise the price, that the newspapers were careful in criticizing people who spent some hundreds a year with them. Mr. Rice noted the renting of arc lamps was recommended. Like many others, he had discarded this plan in favour of selling by instalments. Once owned by the user, they were retained, and, he maintained, at low rates. Mr. Enright wanted to know why electric companies could afford to be so much more liberal in the matter of appliances than gas companies. They put up arc lamps and maintained them free; and he believed gas could afford to do as much as electricity. He believed in maintenance on low terms, and that the appliance should, if possible, be sold outright. Mr. Butterworth asked if the gist of the paper had not been overlooked. The point was the desirability of working up existing consumers in preference to cultivating new ground. At Denver, they were so far convinced that they were putting the best part of their energies into increasing sales among the existing customers. In future, the canvassers would be paid not on the number of appliances sold, but on the basis of increased sales of gas. An increase of 5 per cent. on existing customers was more profitable than 15 or 20 per cent. gained by additional ones.

Mr. Perkins, in replying, said that he preferred to rent rather than sell outright in respect to high-power lamps, because he was thus able to retain control over them. When they belonged to the customer, they were apt to be neglected. In his experience, rented lamps remained in use better than purchased ones.

The Library Committee.

The report of the Library Committee expressed disappointment at its small use—not half-a-dozen books having been called for during the year. This might be due to some of the regulations being objectionable, or to the thing being not sufficiently known. They asked for suggestions from members on the first point, and proposed that a brief quarterly bulletin be issued to each member. The Committee had prepared a card index embracing 1340 references to books and articles on gas subjects.

(To be continued.)

THE LIMIT OF ECONOMICAL CARBONIZATION.

At the Meeting of the Western (U.S.A.) Gas Association, held at Indianapolis from May 20 to 22, Mr. J. Somerville read a paper on the question of the maximum economical yield of gas per pound of coal carbonized. In doing so, he began by recognizing that there is a point where the cost of producing gas is more than the value of the yield; though he doubted the possibility, owing to varying conditions, of saying where it is, inasmuch as some coals require for their proper distillation a higher or a lower temperature than others. Then there is the question of candle power, which changes in different localities. These variations will not permit of any hard-and-fast line being laid down as to the proper degree of heat that will produce the best results; and therefore the matter comes to be one of locality. At the same time, the question remains: How far is it possible to force the distillation of coal? Speaking from his own personal experience over a number of years, Mr. Somerville has found it profitable to limit his yield from what is called "second pool Youghiogkeny coal" to 4·7 and 4·75 cubic feet per pound. This gives a gas of about 17-candle power, varying somewhat with the state of the temperature, and requiring from 5 to 7 per cent. of cannel to bring it up to the required standard of 18 candles. He has at different times increased the heats, until the make has risen from 4·75 to 5 cubic feet per pound. Taking the cost of the coal at $3 per ton, this additional 500 cubic feet effected an apparent saving of 15 c. per ton of coal carbonized; and on the year's supply of (say) 23,000 tons, it amounted to the very considerable sum of $3450. He thought, if this increased yield could be shown to be clear gain, his colleagues would agree with him that such a saving was "a consummation devoutly to be wished." Unfortunately, however, it is not so. Mr. Somerville has found, from repeated experiments, that the extra 500 cubic feet do not by any means constitute a clear gain—in fact, it was doubtful whether there was any advantage whatever.

Taking this apparent saving of 15 c. per ton on the cost of coal, Mr. Somerville proceeded to inquire whether or not it was really saved. First of all, he pointed out that, as a set-off, there was a smaller quantity of coke produced equal to the weight of the 500 cubic feet of gas—say, 17 lbs. This, at $3 per ton, is worth 2·5 c. In the next place, he found that the extra fuel required for a yield of 5 cubic feet per pound amounted to a bushel of coke per ton of coal carbonized, or about 10 per cent., which amounts to 6 c. Then, in making a new contract for his tar, a buyer asked him if he used high heats. He replied that he aimed to take out of the coal all of what he termed "commercial" gas, and that his yield was about 13 gallons of tar per ton. That being so, the buyer said he could afford to give half-a-cent more per gallon for it than for that made with high heats; and he did so. Mr. Somerville found, when getting 5 cubic feet to the pound, that the tar deteriorated both in quantity and quality, dropping from 13 to 11½ gallons. He therefore felt justified in deducting this half-cent from its value, which was equal to 6½ c., and for the less quantity produced (1½ gallons, at 4 c. per gallon), 6 c. He found no difference in the quantity or the quality of the ammoniacal liquor; but the illuminating power of the gas dropped from 17 to 16¼ candles. Summing up, he had to set against the saving of 15 c. the following items: Less coke made, 2½ c.; increase in fuel, 6 c.; less value of tar, 6½ c.; less quantity of tar, 6 c.—total, 21 c.

Mr. Somerville went on to point out that with modern regenerative furnaces the percentage of fuel would be (say) 2 c. less than the figure he had given, and that there would be a saving in labour when making 5 cubic feet to the pound of coal, as less material would have to be handled, and there would be fewer retorts in use. He showed this more clearly by producing the cost-sheet for the manufacture of a million cubic feet of gas; setting out the cost of carbonizing 105·26 tons of coal at $3 per ton yielding 9500 cubic feet of gas, 1240 lbs. of coke (of which 30 per cent. is used under the retorts), and 13 gallons of tar, per ton. The figures were as follows:—

	Cost.		Cost per 1000 Cub. Ft.
Coal	$315·78	..	31·6 c.
Labour	120·00	..	12·0
Fuel (19·6 tons)	58·80	..	5·9
	$494·58	..	49·5 c.
Deduct residuals	191·82	..	19·2
	$302·76	..	30·3 c.

Residuals.

Coke, 45·7 tons, at $3	$137·10
Tar, 1368 gallons, at 4c.	54·72
Total	$191·82

Mr. Somerville also gave the following figures showing the cost of carbonizing 100 tons of coal, yielding 10,000 cubic feet of gas, 1223 lbs. of coke (of which 40 per cent. is used under the retorts), and 11½ gallons of tar, per ton:—

	Cost.	Cost per 1000 Cub. Ft.
Coal	$300·00	30·0c.
Labour	114·00	11·4
Fuel (24·46 tons)	73·38	7·3
	$487·38	48·7c.
Deduct residuals	150·32	15·0
	$337·06	33·7c.

Residuals.

Coke, 36·69 tons, at $3	$110·07
Tar, 1150 gallons, at 3½c.	40·25
	150·32

The author remarked that the result appeared to be about the same as his former figures showed; and, if they were correct, the maximum economical yield of coal did not lie in the direction of high heats, which were invariably accompanied by certain disagreeable and expensive incidents. For example, there were 15 lbs. of tar per ton of coal carbonized converted into free carbon, which choked the ascension-pipes, increased the wear and tear of the benches, and caused greater radiation of heat from the settings. In this connection, Mr. Somerville called attention to the paper communicated by M. Euchêne to the International Gas Congress in Paris in 1900, on "Thermic Reactions in the Distillation of Coal."* He went on to say that primarily high heats are the cause of naphthalene obstructions in the works and mains. Then, by increasing the yield from 4·75 to 5 cubic feet per pound of coal, the illuminating power of the gas is reduced by one candle; thereby necessitating the use of an additional quantity of cannel or other enricher to bring it up to the required illuminating standard, the cost of which has to be charged to the extra gas made.

In conclusion, Mr. Somerville remarked that it was well for gas managers to remember that as there is a maximum economical limit to the speed of a dynamo, a railway train, and a steamship, so is there one to the yield of gas from a ton of coal. He mentioned these truisms because he found it had become the fashion to speak, without any qualification, of a ton of coal of 2000 lbs. yielding 10,000 cubic feet of gas. Even some gas managers indulged in this exuberant sort of talk; thereby conveying to the minds of municipal councillors and others a very erroneous impression in regard to the cost of making gas.

Discussion on the paper being invited, Mr. M'Ilhenny instanced a large gas company using Penn, Westmorland, and West Virginia coal, that experimented for two years first with high, and then with moderate, heats. The results agreed with the conclusions given in the paper, and more money was earned on a make of 4·75 cubic feet than on 5 cubic feet or more per pound of coal. Mr. Gimper understood that the author used open fires; and with these it would be difficult to get up to 5 cubic feet per pound. Using full-depth regenerators of the Bredel type, he had no difficulty in getting this quantity of 17-candle gas. When he put in the new benches, he also had difficulty about the quality of the tar. He met this by separating the condenser tar from the hydraulic tar; and the heavy tar was used for making pitch. Mr. Runner used full-depth benches, and actually sold over 5 cubic feet per pound. He had similar difficulty about the tar; also some little trouble from naphthalene, and stopped pipes. He was not under any restriction as to candle power, but made about 17-candle gas by the jet photometer. He sold coke by measure and not by weight. Mr. Hartman was an advocate of high heats, and thought the troubles usually experienced were due to defects in apparatus, and not to a faulty principle. By studying the thermal conditions in the retort, it might be possible to obtain a high yield without waste of illuminants and formation of naphthalene and carbon. The objectionable feature of the present form of retort was that the gas passing along the upper wall was heated as much as, or more than, the bulk of the coal. The upper portion of the retort should be less conductive of heat than the lower part. Mr. Mitchell found there was more money in 5 cubic feet per pound than in 4·75 cubic feet. He used cheap slack coal for fuel; and his retorts stood for 27 to 30 months. There was a little trouble from chokes. He made a 16½-candle gas. Mr. Carroll Miller thought the author's balance-sheet was rather too favourable to the low yield, and that there was really 1d. or so per 1000 cubic feet in favour of the 5 cubic feet. But he did not advocate the 5 feet, because he thought this slight saving was not enough to cover the troubles of carbon, naphthalene, &c. Mr. Fitzgerald said there was no economy of labour in high heats. The extra cleaning of ascension-pipes and hydraulics more than covered the smaller quantity of coal turned over. Mr. Somerville briefly replied.

* See "JOURNAL," Vol. LXXVI., pp. 1080, 1141.

SOCIETY OF CHEMICAL INDUSTRY.

Annual Meeting in Bradford.

The Annual Meeting of the above-named Society commenced in the Technical College, Bradford, on Wednesday, under the presidency of Mr. IVAN LEVINSTEIN, of Manchester.

The proceedings opened with a hearty welcome from the Mayor (Alderman D. Wade), after which the General Secretary (Mr. C. G. Cresswell) read the names of the new members appointed to the Council for the year ending July, 1904—the President being Sir William Ramsay, K.C.B.,&c. The new President having briefly expressed his thanks for the honour conferred upon him, the Secretary proceeded to read the report of the Council. It set forth that the number of members on the register was now 3948, compared with 3794 at the last annual meeting. During the year, 378 new members had been elected, compared with 340 before; and the losses had been 224, against 181. There had been 44 deaths, compared with 29 during the previous year. The annual volume of the "Journal" for 1902 numbered 1570 pages, or 131 pages per month, against 107 pages in 1901. During the session, 81 original papers, together with discussions, had appeared in its pages, compared with 110 before. In response to an appeal for funds from the National Physical Laboratory, the Council had made a grant of £300, in three annual instalments of £100, from the funds of the Society, to assist the laboratory in carrying on its work. Mr. R. Forbes Carpenter (the Chief Inspector under the Alkali, &c., Works Regulation Acts) had been elected to succeed Mr. George Beilby on the General Board of Management. For some time past the Council had been of opinion that the position of the Society would justify the grant of a Charter of Incorporation, and that such recognition would add to the dignity of the Society, besides giving it a legal status. Accordingly, a Committee was appointed to take preliminary steps in the matter; and assurances of so encouraging character have been received that the Council proposed to ask the members of the Society to authorize the presentation of a petition to the Privy Council. The report was adopted, as was also the financial statement submitted by the Honorary Treasurer (Mr. S. Hall), which showed a balance in hand of £458 3s. 5d. Mr. Hall mentioned that the Society's investments had been increased during the year by £1977.

In connection with the reference in the report to the grant made by the Society to the National Physical Laboratory, the President said it was on similar lines to the Physikalische Reichsanstalt in Berlin, which had done so much useful work for the trade and industry of Germany. It had long been felt that a similar institution ought to be established in this country; and the Government having been prevailed upon to take the matter up, the National Physical Laboratory was opened last year. But whereas the German Government gave £200,000 towards the building of the Berlin laboratory, and an annual subsidy of £17,000, the British Government only contributed £13,000, and a subsidy of £5000 a year for five years. In these circumstances, voluntary funds were absolutely necessary; and when an appeal was made for contributions, the Council took a liberty with the Society's purse and subscribed £300.

The President then delivered his Inaugural Address, which was devoted to the consideration of recent legislation and other matters affecting the trade and industries of the country. He maintained that America and Germany would not have attained to their present eminent industrial position but for their fiscal policy. Their prosperity could not have been created without the high tariffs which they had put up against our traders, or without other legislative measures which had benefited the trading community to a high degree. Dealing with the question of education, he stated that too exclusive importance had been attached to superior education as a special factor in industrial progress. He was perfectly convinced that in general technical education we are in no way behind America, except, perhaps, in that branch which deals with the treatment of iron and in mining. Again, the special advantage of German education lay in the fact that the student only began to specialize at an age which admitted of a previous thorough and systematic training in general subjects and of a broad cultivation of the mind. With regard to the Education Act, 1902, while it was generally admitted that it would be of value in the improvement of primary education, it was doubtful whether it would, in the immediate future, advance secondary education. To raise secondary education to something like the German standard would be very costly; and, having regard to the large expenditure on primary education under the Act, it was only natural that the Education Committee, constituted as they were, should be very reluctant to incur the additional expenditure needed to make secondary education efficient. What appeared to be urgent, in order to prevent the work of the technical schools and University colleges being kept at a standstill for lack of a sufficient number of boys ready prepared to take real advantage of their teaching, was the equipment, in all important centres, of first-rate secondary schools of the German "real gymnasium" type, staffed with the very best and ablest teachers, and with low school fees, in order to give proper chances to able youths of moderate means. The leaving-certificate of such secondary schools ought, as in Germany, to give the right of entrance, without any further examination, to our best technical schools and

Universities. As to the proposal to erect a "London Charlottenburg," as set forth in the recent letter of Lord Rosebery, the President seriously questioned Mr. Haldane's opinion that the erection of five or six Charlottenburgs would greatly improve our position, so far as technical education was concerned. He said a comparison of the number and character of the students at the ninety British educational institutions in which technological subjects were taught with those of the students at the nine technical high schools in Germany showed that the real difficulty here was not the want of technical schools, but of properly-prepared students for those existing. It was probable that of the 3873 students taking technological courses in this country, not more than 10 per cent. could pass the entrance examination of the Charlottenburg School; while of 15,442 day students attending in 1902 the nine German technical high schools, 12,422 had passed the very difficult matriculation examination of these secondary schools. If a system of high-class secondary education, accessible to all grades, were established, and sufficient inducement were given for the boys to stay long enough at school, then efficient scientific and technical education would follow here, just as did in Germany.

Passing on to speak of the patent laws, the President described the recent amending Act as sound and equitable to British inventors, as well as to British manufacturers. But surely it should not, he said, have required so many years of constant agitation, and so much expenditure and labour on the part of private individuals, to pass a Bill which was so manifestly just to British trade and commerce. It was lamentable to contemplate the millions of money which this country had lost by the delay in amending the patent laws, and to reflect upon the enormous difference it would have made in the position of the chemical and allied trades and other industries if the Bill of 1902 had come into force in 1883, when attention was first called to the inefficiency of section 22 of the old Act, instead of twenty years later. An opinion had been expressed that the provision of an appeal to the Judicial Committee, on account of its great expense, seriously interfered with the advantages of the Bill, and might make it almost abortive. He did not share this opinion. He thought an appeal to the Judicial Committee would be very rarely made. Since the law was now, at last, clearly defined, even petitions to the Board of Trade would not be of frequent occurrence, as friendly arrangements would be effected between the parties concerned in ninety instances out of a hundred, without reference to the Board. This was the case in Germany, where the requirements of the law were similar.

The President devoted the closing portions of his address to a discussion of the fiscal problem now before the country, and the advantages of cheap production. In connection with the tariff question, he drew attention to the slackness on the part of the Government in making known at the earliest moment contemplated alterations of foreign tariffs. He emphasized the need of a Ministry of Commerce; and stated that what was required was not merely a redistribution of work among the various Government departments, but a special commercial department, with a Minister of exceptional ability and knowledge at its head. He urged that the question whether or not a change in our fiscal policy was desirable, should not be decided by phrases or catchwords, but that the spirit of science, the search for truth, careful inquiry and investigation, should prevail, and guide the minds of those who had on their shoulders the very grave responsibility of shaping the future prosperity of this great country.

In moving a vote of thanks to the President for his address, Sir William Ramsay characterized it as an effort of "brilliant common sense." Referring to German commercial methods, he said he had been informed that there was in existence a Council, whose proceedings were kept quiet, who took into consideration statistics, and as far as possible legislated, or endeavoured to legislate, on the basis thereof. Where duties were required, they were put on; where there was an advantage to be gained by lessening duties, they were lessened; and where cheap transit was desirable, it was given.

The motion was carried by acclamation, and the President briefly responded.

It was decided to hold the meeting of the Society next year in New York; and this brought the sitting to a close.

In the evening, there was a reception of the members at the Town Hall by the Mayor and Mrs. Wade; and on the following day a number of visits were paid to works in the city and neighbourhood. The President held a reception at the Midland Hotel on Thursday evening, followed by the annual dinner; and on Friday there was an excursion to Ripon, Studley Royal, and Harrogate.

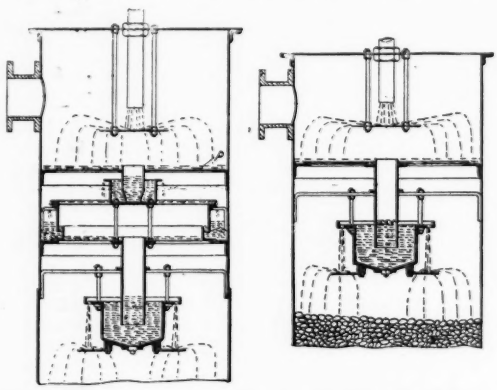
The Hubert Incandescent Burner.—The last number of the "Journal de l'Eclairage au Gaz," contains a description of the above-named burner, which is very highly spoken of for its light-yielding properties. It is made in nine sizes, suitable for consumptions ranging from 1 cubic foot up to 13 cubic feet per hour at 14-10ths pressure, or up to 17½ cubic feet at 28-10ths. It is claimed for the burner that, with gas at 30 c. per cubic metre, it costs only 0·3 c. to 0·36 c. per carcel-hour, against 3·5 c. to 3·75 c. for incandescent electricity; while with gas at the price now being charged in Paris (20 c. per cubic metre), a Hubert burner of 30-candle power would cost 0·5 c. per carcel-hour.

REGISTER OF PATENTS.

Removing Impurities from Gases—Crossley, W. J., and Rigby, T., of Openshaw, Manchester. No. 14,167; June 23, 1902.

This invention has for its object to remove the impurities from gases coming from gas-producers, blast-furnaces, and the like, and to make them clean enough for use in gas-engines and similar apparatus.

The way in which these operations are carried out is as follows: The gases are passed through a tower (two forms of which are shown), the greater portion packed with coke or other suitable filtering material. In the upper part of the tower is arranged a horizontal plate or sieve perforated with small holes. In the middle of the plate is a vertical pipe, which carries the centre portion of the plate and projects a little distance above it. The lower part of the pipe is sealed in water contained in a vessel suspended in the centre of the tower, and under the



perforated plate. Water is arranged to flow over the horizontal plate in the direction of the projecting pipe; and flowing over the projection, it descends into the vessel containing water, by which the lower portion of the pipe is sealed. The water in this vessel overflows, and is distributed over the coke or other material directly below it.

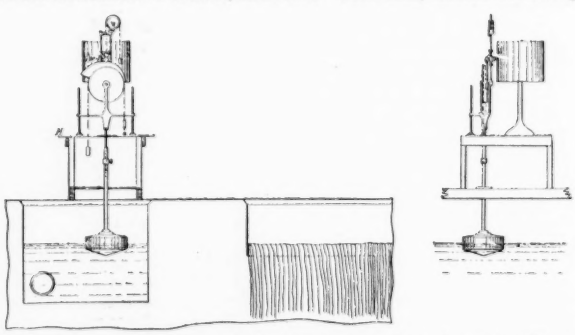
The gases passing through the filtering material are brought into contact with the water, and (losing some of their impurities) ascend upwards and split into a number of small streams in entering the perforations in the horizontal plate. The gases entering the perforations prevent the water on the top side of the plate from dropping through; and the ascending gases bubble through the water into the chamber above. By these means the impurities are washed out of the gases, and are carried away with the flowing water into the bottom of the tower.

When a considerable quantity of impurities are to be removed, other horizontal perforated plates are arranged, one above the other, in the tower, in such a manner that the lowest plate has the largest perforations, and each successive plate in turn has smaller perforations. The clean water is distributed and flows over the top plate, having the smallest holes; and washing the gases, it finally descends to the plate immediately below it, laden with the impurities from the top plate. The water, with an increasing proportion of impurities, descends to each successive plate; and finally, having passed through the filtering material, flows out from the bottom of the tower.

Measuring and Recording the Flow of Water.—Hutchinson, D. L., of Spring Gardens, S.W. No. 17,451; Aug. 8, 1902.

This invention is an improvement on patent No. 9481 of 1893—for measuring and recording the quantity of water passing over a notch, sill, or weir, or flowing in a channel or pipe, or through an opening—so that the desired diagram can be drawn to a much larger scale, and therefore smaller differences of rates of discharge can be read.

In the present invention, the continuous record is traced on paper on a clockwork-actuated drum by a pen or pencil actuated through a cam on the movement of a float, as shown. This cam, instead of having



only one movement transmitted to it by the float, has a rectilinear movement of, and at the same time a rotatory movement about, its axis. The rectilinear movement is effected by having the axis of the pulley carrying the cam in a frame on the end of a rod, adjustable as to length and connected to the float; the rod being guided in any suitable manner. To obtain the rotatory movement, the cam-pulley has secured to it one end of a cord or wire, the other end of which is attached to any desired fixed point. A counterweight is also secured to the pulley so as to tend to keep the wire stretched. The cam having the two

movements described requires to be less steep to have the same action on the pen or pencil; and therefore the diagram can be of much larger scale.

Coin-Freed Gas-Meter.—Cox, W., Staples, W., and George Glover and Co., Limited, of Chelsea. No. 19,494; Sept. 5, 1902.

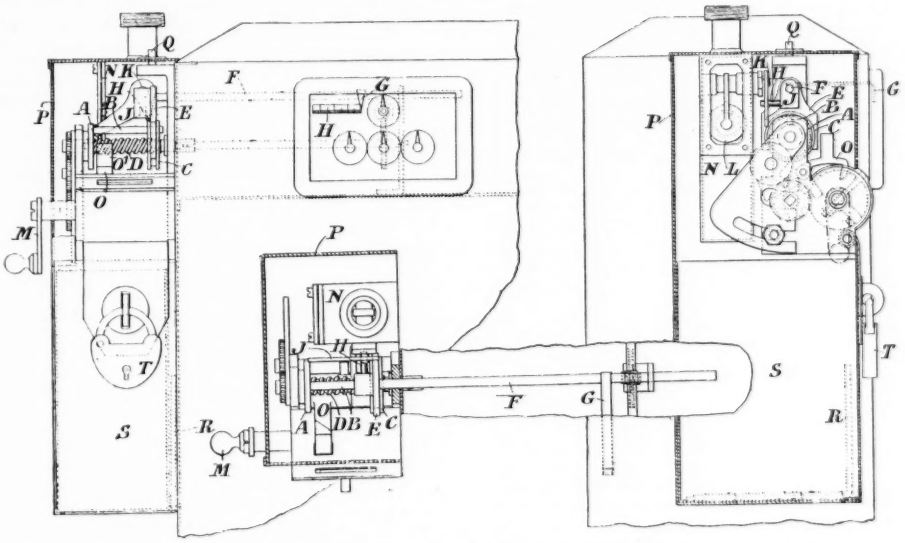
This is a modification of patent No. 20,710 of 1899—"designed to simplify and improve the construction of the apparatus whereby the examination and adjustment of the coin-mechanism is facilitated by placing the whole mechanism outside the meter-case, and whereby friction is reduced to a minimum, and the work of the meter is lightened."

The spindle of the Geneva stop-wheel mechanism described in the earlier patent is geared to a disc A, which carries a crank-pin B. This crank-pin passes freely through a hole in a nut C, which works on a quick-threaded screw D coupled to a shaft driven by the meter-mechanism. The longitudinal movements of the nut on the screw are utilized for opening and closing the inlet-valve of the meter, and for actuating the indicator. For this purpose, the nut is constructed to engage with a forked piece E—for example, by arranging the forked piece to enter an annular groove in the periphery of the nut. The piece is secured to a rod F, which slides in bearings or guides, and which carries a pointer G that moves over a scale H on the meter-dial, and indicates how much gas paid for still remains unused. The piece E also carries a pin H, which co-acts with a lever J fixed on the spindle K of the controlling or gas valve L, and serves to open the valve when the nut moves to the left from the position first shown, and to close it again when the nut returns to the position indicated. The closure is effected by the pressure of the pin against part of the lever J.

The valve is opened by inserting coins in the coin-pocket mechanism, and then turning the handle M, which (through the coin and the intermediate gearing) drives the disc A and its pin B, and so rotates the nut C in the proper direction for moving it towards the left, and so opening the valve. The nut is brought gradually back again, and the valve eventually closed, by the action of the meter-mechanism, which rotates the screw D and moves back the nut to its starting-point.

The valve L is a flap-valve carried by an arm; and its seat is arranged vertically so that any liquid that may reach the meter from the main will not lodge on the valve and seat faces. It is enclosed in a valve-box N, forming part of the inlet-pipe, and preferably furnished with a removable door or cover plate to admit of obtaining ready access to the valve.

In order to prevent the mechanism from being damaged by the insertion of an excessive number of coins, it is arranged that, when a predetermined number of coins have been inserted, either the piece E or the nut C shall come into the path of a projection on the pawl O, which is raised each time a coin is used in operating the coin-pocket mechanism, and thus prevent the pawl from being lifted to allow the next coin to pass. By this means, the user ascertains, by his inability to turn the coin-pocket, that no more coins can be passed in until sufficient gas has been consumed to enable the piece E or the nut C to move out of the path of the projection on the pawl O.



Conveyor for Incandescent Coke.—Marshall, F. D., of Copenhagen. No. 18,131; Aug. 18, 1902.

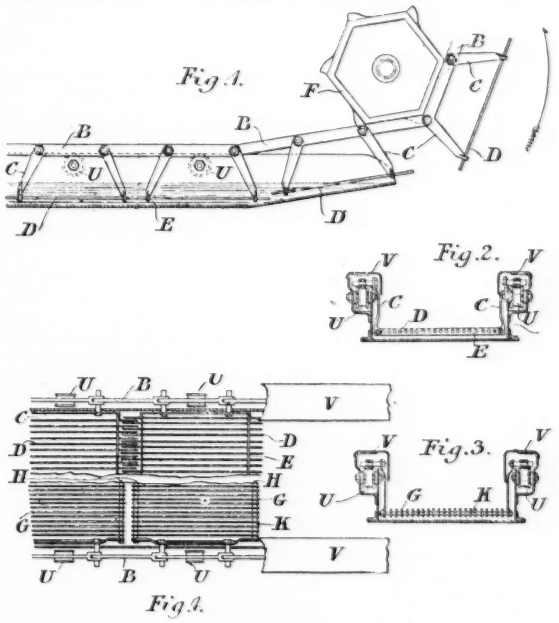
Explanatory of his arrangement, the patentee remarks: It is well understood that, on the slaking or quenching of hot coke from gas-works retorts, water is a necessity; and where the production of coke is great (as in the case of large works) some rapid, economical, and efficient method of dealing with the material becomes essential. The quantity of water absorbed by the coke when it is slaked in the ordinary way is comparatively small—not exceeding on the average perhaps 15 per cent. of the weight in the first instance, and the bulk of this evaporates when the coke is deposited outside the retort-house in the open air. About 3 per cent. of moisture is generally understood to be permanently retained. An important object of the present invention is to facilitate the quenching of the hot coke with a minimum expenditure of water and labour, and to afford the maximum facility for the separation or draining off of the water from the coke as it lies on the conveyor grill during transport, by its draining back into the channel, from which, of course, if need be, it can be reused.

In order to most efficiently remove, quench, and drain the hot coke, the problem to be solved is the immediate removal from in front of each retort, as it is discharged, of the coke falling out of the retorts. It is necessary to provide a conveyor of sufficient capacity to receive the heaps of coke, and for this conveyor to be capable of travelling at such a speed as to convey the coke out of the way of the retort-men without delaying them in their work, and further to effect the operation of conducting the coke to the store-heap in the yard.

It has been found that the principal difficulties met with in the mechanical handling of coke are: Rapid wear of the machinery, owing to grit from the coke; excessive friction, causing undue strain on the machinery; destruction of the parts, through contact with hot coke; and deterioration of the coke, through the tumbling motion imparted to it.

The present apparatus consists of a water-tight trough placed in front of, and adjacent to, the retort-ovens to receive the hot coke as it falls from the retorts. In this trough works an endless gridlike conveyor and drainer of the construction shown. The chain B (of any serviceable description) works on rollers U attached to the outer side of the upper edge of the trough, and is protected by a covering plate V. This chain carries a peculiarly shaped link C or attachment, which, in its turn, carries the portion of the apparatus which receives the coke falling from the retort mouthpieces and conveys it "during quenching with water besides serving very efficiently as a straining surface which allows the superabundant water to drain away from the coke during transit from one end of the trough to the other."

This carrier grid, or screen and drainer, may be of the alternative designs shown, and be constructed either of rods or bars D, as figs. 1, 2, and 3. These bars or rods are carried by a cross-bar E, and the whole is suspended from, and actuated by, the link or attachment C, which, in its turn, is actuated by the sprocket wheel F; or (as an alternative plan) the bars or rods may be replaced by flat pieces of iron G placed



on edge, as figs. 4 and 5, and secured by cross-bars H and distance-pieces K.

As an alternative—to provide for the chain and carriers returning underneath the trough—the connecting links or attachments are dispensed with, and the flat iron carrier is constructed with pinions, to

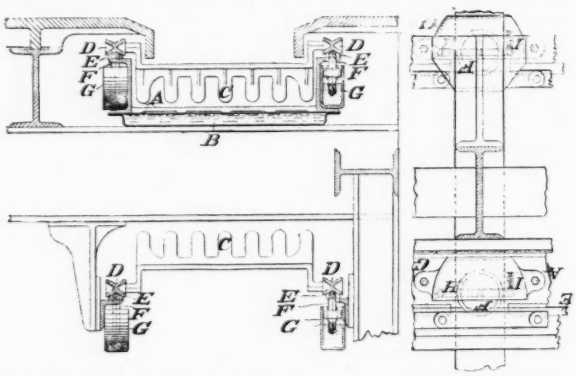
the ends of which are attached rollers working on angle-guides placed in the trough itself. These rollers work over sprocket wheels at the ends of the trough.

The flat bars placed on edge, forming the carrier, are varied in shape so as to provide upwardly and downwardly projecting parts—thus causing a projection at intervals over the carrier, so as to better enable it to catch the coke particles; while at intervals projections are found under the carrier so as to enable the same to be fitted with cross-bars to enable the carrier to cleanse the trough from the *debris* and fine coke which may fall through the bars.

As an alternative to the form of the connecting link or attachment having a horizontal body and outwardly inclined arms, the same may be varied to take the form of Y; the object of this special form being to allow of the chain or combination of linked parts actuating either the scraping bar as used in the De Brouwer type of conveyor or the screen in the screen type of conveyor, to be placed in a protected position outside the trough, and at the same time to be able to sink the scraper-bar or a screen to a suitable level, where it works in water just clear of the bottom of the trough.

Coke Conveyors and Elevators.—R. Dempster and Sons, Limited, and Broadhead, J. W., of Elland. No. 20,057; Sept. 13, 1902.

This invention is especially applicable to conveyors or elevators for coke or other materials in which the moving chains run outside the trough containing the material being conveyed. The chains are made to slide upon paths which are preferably away from the material being conveyed, and when required easily lubricated. This is effected by making the chain with a V groove or concave recess along two sides of the entire length of each link, and carried or supported on guide-bars of Λ ridge, or convex section to, or carried from, extensions of the conveying trough or from the structures carrying the trough. These guides may be interrupted at intervals of (say) 30 or 50 feet, by lubricating rollers of similar section at their periphery—that is, bevelled-edge or convex. These lubricating rollers work in conjunction with oil



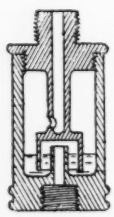
or lubricant baths or troughs, and are kept in contact with the chain through the gaps or intervals of the carrying-bars, by means of springs or eccentric spindles.

A is the trough containing the material being conveyed—provided or not with a water-jacket B. The rakes or scrapers C are connected at each side to the travelling chain D, which slides on the guide-bar E. The bar may be interrupted at intervals to allow of the lubrication of the chain by rollers F, the lower edge at any moment of each roller being immersed in the lubricant in the oil cup or bath G, and such rollers being rotated by the movement of the travelling chain in such manner as to transmit to the chain and its guide or path E the required amount of lubricant.

In order to compensate for wear of the rollers F, they may each be mounted on a bar H, hinged at one end and pressed up against the chain by a spring I acting on the other end of the bar H.

Automatic Valve for Gas-Pipes.—Nusch, F.; a communication from the Deutsche Gasselbstzünder Actien-Gesellschaft, of Berlin. No. 8151; April 8, 1903.

This invention relates to an automatic valve to shut off the gas-pipe as soon as the pressure in it decreases or ceases altogether. There have already become known (the patentees point out) valves for the same purpose consisting of a solid valve-body resting on a solid or liquid valve-seat, which shuts off the gas as soon as the pressure ceases which keeps the solid valve body in suspension. These valves have, however, the "disadvantage that they do not act reliably, and cannot be made very large without considerably lessening the pressure of the gas supplied to the burner." The object of the present invention, therefore, is to overcome this disadvantage, by using a liquid valve-body which acts as a stopper in the pipe, and which is displaced to allow the passage of the gas as soon as there is attained a certain pressure in the pipes; while it shuts off the supply as soon as the pressure sinks to a certain degree.

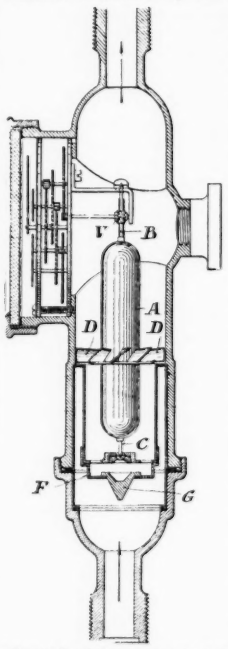


The valve shown consists of a cylinder, in the thick bottom of which there is a central boring enlarged at the lower end, and having internal screw-threadings for the screwing on of the valve to the gas-pipe. From the centre of the bottom of the cylinder a tube projects upwardly. The cylinder is closed at the top by a plate screwed into the upper end of the cylinder, and provided with a central boring which is continued through an upper and a lower tubular projection. At the end of the lower projection a bell is fixed, which surrounds the tubular projection of the cylinder. The bottom edge of the bell dips into a liquid (glycerine or other suitable material) which rests on the upper surface of the bottom of the cylinder.

When the valve is screwed on to the gas-pipe and the burner to the upper projection of the top plate of the regulator, the gas under pressure rises through the central boring of the bottom of the cylinder, and, after filling the bell, displaces the liquid so far that the gas can pass below the edge of the bell and get to the burner by passing through the lateral opening of the tube and the central boring of the top plate. When, however, the pressure ceases, the liquid assumes the original position—thus shutting off the gas-pipe and preventing the entering of outer air to the same.

Liquid Meters.—Pascal, F., of Lyons, France. No. 6182; March 17, 1903.

This invention relates to meters of the kind where the speed of the water is measured by the rotation of a spindle provided (in a plane normal to it) with a number of inclined blades, the theoretical shape of which is a portion of a helical surface, so that the inclination of each of the elements of the surface gives it a tangentical speed proportional to its distance from the axis of rotation. The indications of such an apparatus would be perfect if injurious resistances could be eliminated, the most important of which is that due to the friction of the pivots of the moveable part in its bearings.



In order to nullify such resistance, the weight of it is made equal to the volume of water which it displaces. It is formed, for example, as a cylinder A with thin walls closed at the ends by spherical or conical caps, through which pass the pivots B and C, forming the spindle of the cylinder. Inclined blades D (of which there may be any desired number) are arranged round the centre of the cylinder and perpendicular to its axis of rotation; the distribution of the masses being such that the axis of inertia coincides with the axis of rotation of the cylinder. The whole is experimentally balanced in water with great care, to ensure of its specific gravity being equal to that of water. The transmission of the rotary movement to the clockwork is effected in the usual way, by means of an endless screw V secured to one of the two pivots.

Finally—in order to render the meter more sensitive for very small outputs—the following arrangement has been adopted: The support of the lower pivot forms a cup provided outside with a jacket, so as to leave an annular space communicating (close under the ends of the blades) with the upper portion of the meter by means of small holes. The bottom of the cup is perforated round the pivot, and provided at the bottom with a counter cup F serving as a seat to the valve G, which opens in case of a large output. The water entering under the blades and round the cylinder slides along the whole surface of the blades, and causes the cylinder to rotate with a speed in proportion to that of the water. When the quantity of water become small, the valve G closes under the influence of its own weight, and the water arrives through the holes, so that it acts only on the ends of the blades, causing the cylinder to turn with a speed in proportion to the quantity of water passing through the holes.

APPLICATIONS FOR LETTERS PATENT.

14,893.—Paul, F. W., "Gas-producers." July 4.

14,934.—Neuhaus, C., "Producing carburetted air for lighting and heating purposes." July 6.

14,939.—Godden, H. L., "Saturating air or gases with other vapours to different degrees of saturation." July 6.

14,941.—Jenkins, H. C., "Gas and oil engines." July 6.

14,944.—Mills, W., "Acetylene generators." July 6.

14,977.—Harper, J., and Co., Ltd., and Retallack, C., "Regulators for incandescent burners." July 6.

15,038.—Crouch, R. L., "Transmitting power or regulating the flow of liquids." July 7.

15,060.—Imray, O., "Gas washers." A communication from F. Burgemeister. July 7.

15,081.—Mitchell, R. A., Lewis, L. L., Wurster, C. H., Gilbert, A., and Davis, J. F., "Starting gas-engines." July 8.

15,013.—Braithwaite, I., and O'Brien, E., "Burners for gas-irons." July 8.

15,120.—Anderson, J. C., "Sparking plugs for gas-engines." July 8.

15,147.—Johnson, J. Y., "Manufacture of gas." A communication from the Deutsche Continental Gas Gesellschaft and J. Bueb. July 8.

15,148.—Cebulla, C., "Gas-kilns." July 8.

15,205.—Johnston, A. A., "Conveyance of coke, coal, breeze, and other substances." July 9.

15,263.—Hume, G. W., "Gas stoves and heating appliances." July 10.

15,303.—Carpenter, C. C., "Anti-vibration devices for incandescent gas-burners." July 10.

15,321.—Cowan, W., "Coin-freed mechanism for gas-meters." July 10.

15,348.—Lea, J. W., and Perrins, J. H., "Comet globe holders for gas-brackets." July 11.

15,397.—Alexander, C. J., "Incandescent burners." July 11.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Crystal Palace Gas Bill.

SIR,—The comment in your article of the 14th inst. on this Bill, where you refer to the question by Mr. Freeman, K.C., and answer by Sir George Livesey, is likely to give rise to considerable misapprehension as to the bearing the point raised had upon the issue. The question had reference to the consumers of gas by the flat-flame burner.

It was several times stated in evidence by the opposition that 15-candle gas as at present supplied by the Crystal Palace Company, when burned in the South Metropolitan Company's special flat-flame burner, gives an efficiency duty of 2·5 candles per cubic foot. With this same burner, which is the best flat-flame burner available, and with the 13-candle gas which the Company propose to supply (*i.e.*, alleged 13-candle gas as tested on the lines laid down in the Bill), the efficiency is but 1·5 candles per cubic foot, or a difference of 40 per cent. The result of this to the consumer by the flat-flame burner is that, to obtain the same light with the proposed gas as he does with the present, he must burn 40 per cent. more, or in other words he must burn 1400 cubic feet in place of 1000 cubic feet with the 15-candle gas, the value of which (based on the current price of 2s. 7d) is 12·4d. And as the allowance the Company propose to make is but 1d. per 1000 cubic feet, the alteration would, if carried out, have practically increased the price to this class of consumer, who still represents the great bulk of the consumption, 1s. per 1000 cubic feet, as stated by Counsel.

After Sir George Livesey's answer—stigmatizing the foregoing as absolute nonsense—the difference of 40 per cent. in the lighting value of the two gases, in the specially suitable flat-flame burner, still remains.

Widnes, July 17, 1903. ISAAC CARR.

PARLIAMENTARY INTELLIGENCE.

FROM THE COMMITTEE ROOMS.

Two Eminent Leaders.

AMONG those whose engagements take them frequently to the Committee Rooms, and who have followed the course of parliamentary gas and water legislation during many years past, the recent intelligence that one eminent leader at the Parliamentary Bar has resolved to retire, and that, if fortune favours his candidature, another will go into the House of Commons as a member, has caused much sincere regret, and the prospect of not having the proceedings before the Committees enlivened by their skilful advocacy is not by any means a happy one. Even among the members of the Parliamentary Bar, the regret is not the less keen, albeit the relinquishment of the huge practices of these two leaders will, of course, mean that more briefs will fall into other hands. Mr. E. H. Pember, K.C., is the one who has definitely determined to retire; and Mr. Balfour Browne, K.C., has offered himself to the Unionist electors of Dumfriesshire. Both these learned gentlemen have been over a long number of years before the industries represented by the "JOURNAL" through the prominent part they have taken in the legislative work of the gas and water undertakings of the country; and their names—particularly that of Mr. Balfour Browne—have appeared in our pages perhaps more frequently than any others while Committee work has been in progress session after session.

As he has been constantly during the sittings for the past forty years, Mr. Pember has been engaged many times in the rooms this session; but at its close, he will be seen there no more as a practising member of the profession. Some notes on Mr. Pember's career have been published by the legal correspondent of the "Daily Telegraph." From them it is pleasant to learn that Mr. Pember is not withdrawing from the arena for reasons of health; and that the one and only explanation for the taking of this step is the fact that he recently celebrated his seventieth birthday. This event, which took place on May 28 last, he had already arbitrarily fixed upon as the date of his retirement. Mr. Pember has worn a silk gown since 1874; and, with the exception of Sir Ralph Littler, K.C., who has precedence of him by a year, he is the senior of the leaders of the Parliamentary Bar. To-night his friends at the Bar will take formal leave of him at a dinner at the Prince's Restaurant, at which he will be the guest of the evening.

Even more surprising, however, is the statement that Mr. Balfour Browne, K.C., is contemplating a change to another sphere of parliamentary work. His election as a member of the House of Commons would, of course, put an end to his appearing before Parliamentary Committees. Should he become a member of Parliament, Mr. Balfour Browne would do so, it is said, "at the cost of sacrificing an income which is estimated at a very high figure." No one who knows anything of his parliamentary work will doubt this. While, as it is his desire to enter Parliament, all will wish him success when the time arrives for him to contest the seat for which he is the candidate, few frequenters of the Committee Rooms would be sorry if non-success meant keeping him at his old practice, in which he has attained so much fame. "In modern times," says the legal correspondent of our daily contemporary, "it has become the fashion to make the Committee Rooms a stepping-stone to legislative renown and law-officerships. Mr. Cripps, K.C., Mr. Worsley-Taylor, K.C., and now Mr. Balfour Browne, K.C., are instances in point."

A Slack Week.

The most sagacious searcher after gas and water news in the lobbies and Committee Rooms would have failed to find more than the merest trace in the past week, and that only in connection with electrical matters. The Somerset Electrical Power Bill occupied Sir F. Godson's Committee during two days; and it was opposed by the Bristol Corporation and the Bristol and West Gloucestershire Water Companies The Bill has passed through the House of Lords; and the same opponents appeared there—the Companies then gaining protection in connection with any loss or damage that may occur to their mains from fusion or electrolytic action. In this case, the clause is a broad one in its effects, covering as it does all immediate and consequential damage from both fusion and electrolysis. However, on the present occasion the main issue the Committee had to determine was whether or not the city of Bristol ought to be excluded from the operation of the scheme. The Corporation have an electrical undertaking of their own; and so they objected to any form of competition. On the other hand, it was sought to show as a point favourable to the promoters that the price charged by the Corporation for electricity was much too high. One witness, representing a large firm of manufacturers, told the Committee that the Corporation charged 5d. per unit for lighting; while his own firm, with their own private plant, were able to produce electricity for 1½d. But those ratepayers who appeared to bolster up the Bill were apparently quite oblivious of the fact that, by assisting in bringing in a competitor, they were not doing anything to improve the position of the municipal undertaking, nor, consequently, the cheapening of the city's own supply. However, the Committee considered that the Corporation should be protected against undue interference, under-cutting of prices, and anything like undue preference to one customer over another with regard to the rates. Therefore they were not prepared to "allow the Company to come in and charge absurd prices." The Committee also expressed the opinion that an official of the Board of Trade should assist them in carrying out these views on the consideration of clauses. All this looks healthy for the Local Authorities who will be appearing this week, before the same Committee, in opposition to the North-Western Electricity and Power-Gas Bill. Both Bills were also considered by the same Committee of the Upper Chamber. As to the further opposition of the Bristol Water Company, the question raised was in connection with the supply of water by them to the promoters for condensing purposes; but, as it was announced that there was no objection on the part of the promoters to the insertion of a clause binding them not to sell water, the Chairman of the Committee saw in this the elements of a compromise. Opposition was also directed against the measure generally on account of the congested state of subterranean Bristol. But the preamble of the Bill was proved; protection for the Corporation to the extent already indicated being the sum of the results of the inquiry into the measure on this occasion,

The Board of Trade and Electricity Powers.

The Board of Trade have frequently shown that they are exceedingly jealous of their duties under the Electric Lighting Acts; and they cannot now brook, without protest, any interference with them even by Parliament. They have always objected to electric lighting powers being obtained direct from Parliament, and have consistently urged that they should be obtained by Provisional Order. The Corporation of Chard in their Gas-Works Purchase Bill this session, in order to save expense, included some clauses conferring powers as to the supply of electricity, and the House of Lords permitted them to stand. But last Friday representations were made on the subject by the Board of Trade to the Commons Committee on Unopposed Bills; and the Committee came to the conclusion that no one would suffer by the omission of the clauses. They were consequently cut out of the measure. The reasons advanced by the Board for their action were not of a particularly robust kind. They will be found set out in the report of the proceedings elsewhere.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills read a second time: Irvine and District Water Board Order Confirmation Bill, Sheffield Corporation Bill.

Bills reported: Bath Corporation Water Bill, Irvine and District Water Board Order Confirmation Bill.

Bills read the third time and passed: Irvine and District Water Board Order Confirmation Bill, Walker and Wallsend Union Gas Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bill brought from the Lords, and read the first time: Irvine and District Water Board Confirmation Bill.

Lords Bills read a second time and committed: Bury and District Joint Water Board Bill, Gas and Water Orders Confirmation Bill, North-Western Electricity and Power Gas Bill.

Lords Bills reported: Chard Corporation Gas and Electricity Bill, Gas Orders Confirmation Bills (Nos. 1 and 2), Water Orders Confirmation Bill.

The Frimley and Farnborough District and Wey Valley Water Companies have petitioned against alterations in the Gas and Water Orders Confirmation Bill [Lords], so far as the Aldershot Gas and Water Order is concerned; and the Rickmansworth and Uxbridge Valley Water Company, against alterations in the Amersham, Beaconsfield, and District Water Order.

The Lighting Committee of the West Ham Corporation have approved of the following patterns of lanterns forwarded to them for use in lighting the side streets of the borough on the incandescent system: The West Ham Gas Company and Gaslight and Coke Company, lantern manufactured by Mr. W. Edgar; the Commercial Gas Company, lantern manufactured by Messrs. S. Pontifex and Co.

GAS AND WATER ORDERS OF THE SESSION.

The Bills to confirm Provisional Orders relating to the supply of gas and water for which application has been made to the Board of Trade this session having now reached the Lower House, the Board have issued the usual Memoranda setting forth the nature of the proposals contained therein.

The Gas Orders in Bill No. 1 relate to Cobham, Conisbrough, Hailsham, St. Ives (Hunts.), and Woking. The Cobham and St. Ives Gas Companies seek power to raise additional capital. The Conisbrough Gas Company, Limited, desire authority to maintain, construct, and continue gas-works, and to manufacture and supply gas within part of the township and parish of Conisbrough, in the West Riding of the county of York. The Hailsham Gas Company wish to maintain and continue their existing gas-works, construct others, and supply gas in the parish of Hailsham, in the county of Sussex. The Woking Order is to amend the provisions of the Woking Gas Order, 1901, with regard to the distribution of revenues applicable to dividend.

Bill No. 2 includes Provisional Orders relating to Brading, Crossgates and district, Herne Bay, Pembroke, and Riddings. The Brading Harbour District Gas Company seek authority to maintain and continue gas-works in the parish and urban district of St. Helen's, in the Isle of Wight. The Crossgates Order is to empower the Crossgates, Halton, and Seacroft Gas Company, Limited, to purchase certain lands by agreement, construct additional works, raise further capital, and for other purposes. The Pembroke Docks and Town Gas Company, Limited, wish to be authorized to construct additional works and raise more money. The Herne Bay and Riddings Companies desire to extend their limits of supply and raise additional capital.

The Gas and Water Orders Confirmation Bill contains Orders to empower the Aldershot Gas and Water Company to raise additional capital, enlarge their existing gas-works, and for other purposes; to authorize the Amersham, Beaconsfield, and District Water-Works Company, Limited, to extend their limits of supply, construct and maintain additional works, and raise more capital; to enable the St. David's Water and Gas Company and the St. Neot's Water Company to raise additional capital; and to empower the Wexford Gas Consumers' Company, Limited, to maintain and continue gas-works, and manufacture and supply gas in the borough of Wexford.

The Water Orders Confirmation Bill contains Orders to authorize the construction and maintenance of water-works and the supply of water within the urban district and parish of Bolsover, and portions of the parishes or places of Scarcliffe and Palterton, in the county of Derby; to empower the Goring and Streatley District Gas and Water Company, Limited, to construct and maintain additional water-works, extend their limits of water supply, raise more water capital, and for other purposes; to authorize the construction and maintenance of water-works and the supply of water in the parishes of Ludgershall, in the county of Wilts, and Kimpton, in the county of Southampton; and to empower the Leatherhead and District Water Company to raise additional capital, and the Mid-Kent Water Company to extend their limits of supply.

With regard to the application of the last-named Company, the Board have issued a special report, setting forth their reasons for dispensing with the consent of the Borden Parish Council—the Local Authority for a portion of the district included within the limits of the Order. The Board held an inquiry, and invited representatives of the Council to be present, but none attended. The promoters produced a letter from the Milton Rural District Council, in whose district Borden is situated, stating that the Council, whose duty it was to see that the district had a proper water supply, were in favour of the parish being included in the Order, and that the Parish Council had not intimated their objection to the proposed scheme. The Parish Council had not lodged any objection with the Board of Trade in regard to the application; and, in the circumstances, it did not appear to them that there was any ground for refusing to grant the promoters the statutory powers asked for as regards the parish in question. They therefore decided to grant the Order.

COMMITTEE ON UNOPPOSED BILLS.

(*The Right Hon.* J. W. LOWTHER, *Chairman.*)

Friday, July 17.

CHARD GAS BILL—THE ELECTRICITY CLAUSES.

This Bill came to-day before the above-named Committee. The object of the measure is to authorize the Corporation of Chard to purchase the undertaking of the Chard Gas Company, and to supply gas and electricity within their borough and the neighbourhood.

Mr. PELHAM, representing the Board of Trade, informed the Committee that it had been decided for some years past, by both Houses of Parliament, that powers with regard to the supply of electricity should be obtained by means of a Provisional Order from the Board of Trade; and in some cases applications made to Parliament for such powers had been refused—the applicants being told that they must seek an Order. There were certain inconveniences attending the grant by Bill of these powers. Under an Order, if the work was not carried out by the promoters within a certain time, the Board had power to revoke it. He understood the Board would still possess this power under the Bill; but it would, he submitted, not be convenient that they should be called upon to revoke the actions of Parliament. Further, it is not easy to look after these things when the power was given by Bill. There was a tendency on the part of local authorities who were the owners of gas undertakings to keep electric lighting powers in existence in order to prevent competition. The Board had to look out for this, and if, after (say) a couple of years, a local authority were not exercising their powers to supply electricity, they called on them for an explanation and to show cause why the powers should not be revoked. If they were contained in an Act, the Board, unless they were very sharp, would not have a record of them; but they kept a bound record of the Provisional Orders, and went through them every year. It was not the duty of the Board to oppose the grant of the power sought; but they wished the Committee to be aware of the facts.

Mr. PRITCHARD, the Parliamentary Agent for the Bill, said Chard was bound to promote a Bill for the purchase of the gas undertaking, in consequence of a clause inserted in an Act of last year. At the same time they desired to have powers to supply electricity, so as to have the choice of the two illuminants. In these circumstances, they did not see why they should incur all the additional expense of applying for an Order, when they could put a few provisions in the Bill they were promoting for the purchase of the gas undertaking. The population of Chard was 6000. The Board of Trade would have exactly the same powers under the Bill as they would have had under an Order.

Mr. JEFFREYS (a member of the Committee): Will not the effect of the clause be to keep out any company desiring to supply electricity?

Mr. PRITCHARD: Not more than under a Provisional Order.

Sir CHANDOS LEIGH (another member of the Committee) said he could not understand how a Corporation with a population of 6000 could make electricity pay. This power was cut out in the case of Tottenham and Edmonton, which, compared with Chard, was a very large district.

After further discussion,

The CHAIRMAN said the electricity clauses had better be struck out. When the Corporation wanted power in regard to the supply of electricity, they could apply for a Provisional Order.

Formal proof of the preamble having been afforded, and the clauses adjusted, the Bill was allowed to proceed.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

July 10 to 13.

(*Before Mr. Justice* FARWELL.)

Yarmouth (Isle of Wight) Town Trust v. Freshwater Gas Company.

This was an action to recover the sum of £13 1s. 1d. for harbour dues or tolls, and also for a declaration that the plaintiffs are entitled to receive tolls or rates on all vessels entering or using the harbour of Yarmouth, and that the harbour extends over the whole tidal estuary of the River Yar. The plaintiffs claimed under the Yar Bridge Act, 1858, and an order of the Charity Commissioners of 1890. The defendant Company have a landing-place on a creek which runs into the Yar above the bridge; and they claimed to be entitled to land goods there without paying tolls to the plaintiffs. They submitted that the plaintiffs had no right to commence the action without the leave of the Charity Commissioners, which had not been obtained. They also set up as a defence that, according to the provisions of the Act of 1858, all matters in dispute under it had to be decided by the Justices of the Peace for the Isle of Wight. They further alleged that their landing-place was not within the limits of the harbour; and, in support of this contention, they referred to proceedings taken by the plaintiffs in 1897 against two men named Drewett, to recover tolls under the Act in question in respect of goods landed at a quay at Freshwater Farm, within the limits now claimed, when the action was dismissed by the Justices on the ground that the quay was not within the limits of the harbour.

Mr. UPJOHN, K.C., and Mr. STEWART MOORE appeared for the plaintiffs; Mr. DANCKWERTS, K.C., and Mr. PETERSON represented the defendants.

Mr. UPJOHN, in opening the case, said his Lordship would not be troubled with details of figures, as the only dispute on this head related to items amounting to 11s. 4d., which the plaintiffs were willing to abandon to save trouble. The real question at issue was the limits of the harbour. The plaintiffs were the successors of a very ancient Corporation—the Mayor and burgesses of Yarmouth—which had a Charter at least as early as the first year of King Stephen, and there might have been previous ones. By the Reform Act of 1883, the Corporation was swept away; and under an order made by the Charity Commissioners, to whom the property was transferred, the plaintiffs were appointed managers, and had rights of action vested in them. The learned Council having gone in some detail into the various Charters and Acts of Parliament conferring rights on the old Corporation,

Mr. DANCKWERTS raised the preliminary objection that the proceedings ought to have been taken before the local Justices.

Considerable discussion ensued on this point. In the result,

His LORDSHIP said, though there was a strong temptation to get rid of the action by upholding the preliminary objection, he could not see his way to doing so.

Mr. UPJOHN then continued his argument, which, in substance, came to this: That the town quay was the only legal quay at which goods could be landed; and if, for convenience, to avoid transshipment or unnecessary cartage, goods were allowed to be taken straight to their destination, they were still liable to the same tolls as if they had been actually landed at the town quay.

Mr. *J. A. Cole*, the Clerk to the Trustees, and formerly Treasurer to the old Corporation, gave formal evidence; while Mr. *Henderson*, the chief coastguard officer, who also performed Customs duties at Yarmouth, and one or two old inhabitants, were also called, with the view of showing that the harbour included the whole tidal way.

Mr. *E. Bright*, the Harbour Master, spoke to the receipt of tolls and

dues, a list of which was posted up at the town quay. He said that, in his view, wherever the tide ebbed and flowed was the harbour.

This concluded the plaintiffs' case.

Mr. DANCKWERTS, for the defendants, said he doubted whether the evidence which had been given of certain persons having paid tolls for goods landed elsewhere than at the town quay was relevant; but, if it were, he had a much larger body of evidence of persons who had landed goods without paying tolls. His view was that the plaintiffs' rights depended entirely on the Act of Parliament. He admitted that all vessels entering the harbour were liable to certain dues for the use of the harbour; but the rates for landing goods were in a wholly different category, and could not be recovered except from persons using the wharf accommodation and conveniences provided by the plaintiffs, and in respect of which the rates were assumed to be charged. He supported this contention by reference to the Act of Parliament and the schedules attached to it. He submitted that really it was not material to decide what were the limits of the harbour, but that the rates sued for could only be charged on goods landed at the town quay.

His LORDSHIP intimated that he was prepared to hold, subject to any further argument from Mr. Upjohn, that the evidence which he had heard, *de bene esse*, as to the receipt of tolls was irrelevant, and must be rejected.

Mr. DANCKWERTS said in that case it would not be necessary for him to call evidence of a contrary character.

Mr. UPJOHN having argued that the evidence just referred to was admissible,

His LORDSHIP ruled that it was not, in construing an Act of Parliament of 1858; and he must therefore reject it. This would relieve the defendants from calling any evidence to contradict it.

Several witnesses having been called to give their views as to the extent of the harbour, the defendants' case closed.

Mr. UPJOHN having addressed the Court in reply,

His LORDSHIP gave judgment in favour of the defendants He said the Act in question was one of the most slovenly drawn he had ever seen, even among Private Acts of Parliament. He considered the tolls and rates mentioned in the first part of the schedule applied to the use of the harbour, and those in the second part to the use of the quay, and goods which were not landed at the quay were not liable to them. The action must therefore be dismissed, with costs.

The Worcester Corporation and their Sewage Scheme.

In the "JOURNAL" for the 2nd ult., we reported some proceedings in the King's Bench Division of the High Court of Justice, before Justices Wills and Channell, in connection with a motion for a rule *nisi* to quash a return to a peremptory writ of *mandamus* and for a writ of attachment against the members of the Corporation of Worcester, for failing to obey an order of the Local Government Board by carrying out a scheme for the disposal of the sewage of the city, so as to prevent its discharge into the Severn, contrary to the provisions of the Rivers Pollution Prevention Act. Their Lordships granted a rule. On Monday last week the matter was again before them, on an application by the Solicitor-General that the return made by the Corporation should be taken off the file, and that an attachment order should be issued. Mr. Willis Bund, for the Corporation as a body, submitted that, although the only proper return that could be made to a peremptory writ of *mandamus* was obedience, the only way in which it could be obeyed was by entering into a contract for the execution of the works; and the Corporation had done everything they could do. Mr. Macmorran, K.C., representing the individual members of the Corporation, pointed out that seven of them were carrying out the scheme as quickly as they could; and he submitted that a writ of attachment could not issue against the remaining 41. Mr. Justice Wills, in giving judgment, said materials were before the Court which would justify them in issuing writs against the entire body. As regarded the seven members, the writ would be made absolute. They would lie in the office until Nov. 15 next, in order to give these defendants an opportunity of coming to the Court and asking for a further stay, on the ground that they had taken such steps in the meantime as would show that they were prepared to obey the order of the Court. With regard to the other defendants, the order would be that the matter stand over until the same date; and he wished emphatically to warn them that they would be in grave peril unless by that time they had taken effectual steps to show that there would be no more of the scandalous and unnecessary delays there had been.

Liability for Damages Caused by an Explosion.

At the Manchester Assizes last Friday, Mr. Justice Bigham and a Special Jury heard the case of *Pearl Mill Company, Limited, Oldham, v. Oldham Corporation*. It was an action to recover damages for injury to a mill by a gas explosion which, the plaintiffs alleged, was caused by the negligence of the Corporation's employees. Mr. Taylor, K.C., and Mr. Byrne appeared for the plaintiffs; Mr. Pickford, K.C., and Mr. Langdon for the Corporation. It was stated, on plaintiffs' behalf, that the Corporation furnished gas to the mill through two meters—a large one, fed by a 6-inch pipe, and a small one which supplied the office only. In August, 1902, it became necessary to repair the large meter; and the Corporation—who did all work, both inside and outside of premises, in the case of alterations affecting the gas supply—expressed their intention to remove the meter. To do this, the 6-inch pipe had to be cut off. From the large pipe running to the main part of the mill there branched off, near the main, a 3-inch pipe which supplied the engine-house. After the gas had been cut off, the Company's Engineer required a light in the engine-house, and, with (as was alleged) the approval of a servant of the Corporation, he removed the valve that regulated the supply from the 6-inch to the 3-inch pipe, and connected the latter with the small meter. On Sept. 26, gas being needed in the mill, the Corporation officials came again. They connected the 6-inch pipe, from which the meter had been removed, with the main. The branch of the 3-inch pipe was open; and the gas, when turned on, escaped through the opening. Coming in contact with the burning jets, it caused an explosion which wrecked a great part of the mill. The question was whether the Corporation or the Company were responsible for the damage. Mr. Pickford contended that the blame lay with the plaintiffs. He said the Corporation's servants were not aware that the valve had been removed and a hole left in the pipe. Counsel intimated that the action had been brought to fix the liability; the question of damages would be referred to an arbitrator. The Jury returned a verdict for the plaintiffs.

Compensation to a Workman's Widow and Children.

At the Croydon County Court on Tuesday last, Mr. Newnham applied to the Hon. Arthur Russell to decide what should be done with a sum of £294 9s. which the Croydon Commercial Gas Company had agreed, under the provisions of the Workmen's Compensation Act, to pay to the widow and children of an employee of the Company who was killed in an accident at the gas-works. Mr. Newnham informed his Honour that there were two children. The deceased man's wages averaged £1 17s. 9d. per week, and the amount agreed upon was only £5 short of the maximum allowed by the Act. The Company would pay the money over in whatever way his Honour might direct. They wished to assist the widow as much as possible, but did not care to hand over so large a sum without some proper understanding. He suggested that £150 should be set aside for the children, and the balance given to the widow. Mrs. Curtis (the widow) said that if the money were handed over to her, a gentleman would invest it for her. She required some of the money for present use. His Honour directed that £44 9s. should be paid at once to her, and the balance of £250 put into the Post Office Savings Bank. He said if she wanted capital for any special purpose she must apply to the Court.

Refusal to Supply Water to an Electricity Station.

At the Mistley Petty Sessions, yesterday week, the Tendring Hundred Water Company were summoned for neglecting to furnish a supply of water to the Coast Development Company's electricity generating station at Walton-on-Naze. Mr. E. J. Naldrett, who appeared for the complainants, pointed out that the Tendring Hundred Water Company were incorporated by Act of Parliament in 1884, and took over the undertaking of the Walton-on-Naze Water and Gas Company. For some time afterwards, they supplied Walton with gas for lighting; but this contract had come to an end, and the town eventually made arrangements with the Coast Development Company to furnish them with electricity. The Company already lighted the pier, and supplied energy for the pier trams. They had moved their generating station to another part of the town, and made formal request for a supply of water to the building. A form of application was sent to the Coast Development Company; but subsequently the defendants refused to supply the water, and, therefore, a summons had been issued. The Water Company had the exclusive right of supply in the area where the generating station was situated; and anyone who required water had to look to them for it. Counsel read a large amount of correspondence between the parties, in which the defendants raised two points—viz., (1) the Coast Development Company were not entitled to a supply under the Act, and (2) the Water Company were not bound to supply. Counsel, however, contended that there could be no doubt that the generating station was a business premises within the meaning of the Act. It was suggested that there was some distinction between "manufacturing" and "business," but he did not recognize it. Mr. H. A. Hood (for the Water Company): But the law does. Mr. Naldrett replied that if generating electricity for lighting a town was not a trade or business, it was difficult to conceive what a trade or business could be. Mr. F. R. Hunter, the Superintendent Engineer of the Coast Development Company's works at Walton, gave evidence, in the course of which he stated that the Company's new premises had no water supply, although a slaughter-house opposite had. The defendant Company's suggestion that they should supply complainants with gas for driving the engines, would not be practicable unless the present engines, which were for steam, were thrown out of use, and gas-engines substituted, at a cost of about £1500. The Coast Company had no difficulty at their previous generating station—that began when they commenced to light the town. Mr. W. R. Dockrell, the Chairman of the Water Company, said their Engineer had advised them that the works were "in a very delicate condition"—which, he stated, meant that the engines were liable to break down at any moment. With reference to the suggestion that there was no friction until the Coast Company came into competition with the defendant Company, witness said that the contrary was the fact—the Water Company had offered to provide the Coast Company with gas at about half the ordinary price, and to provide them with gas-engines on hire. He was of opinion that the electric light helped gas-works. In reply to Mr. Naldrett, witness said he did not think the delicate state of their plant would obviate their liability to supply water for domestic purposes. But in addition to having the large area comprised in the Tendring Hundred to furnish with drinking water, the Company had also to complete before the end of this month certain high and low level arrangements at Harwich. They would be able to meet every requirement on the completion of the new works. In reply to the Chairman, witness stated that the Company refused to supply in the present case on the ground of deficient machinery, and not for want of water. Mr. Hood, for the defence, contended that the general scheme of the Act of 1884 was to protect the domestic supply, so that the complainants were not entitled to a supply for their particular purpose if the defendants could not spare the water. His second point was that the complainants carried on neither a trade nor a business, but a manufacture; and therefore they could not demand to be supplied. In support of this contention, he quoted section 12 of the Water-Works Clauses Act of 1863. There was no ground for the suggestion that the defendants would not supply the water because they desired to prevent the complainants generating electricity. On the return of the Magistrates from a lengthy deliberation, the Chairman said the majority had come to the conclusion to dismiss the case. The Bench would, however, be willing to state a case if necessary.

MISCELLANEOUS NEWS.

THE SOUTH METROPOLITAN GAS COMPANY AND DR. CLOWES.

A Protest by the Directors against his Evidence on the Crystal Palace District Gas Bill.

The following communication has been addressed officially to the London County Council by the Directors of the South Metropolitan Gas Company, and a copy of it sent to the members of the Council individually.

Old Kent Road, S.E., July 13, 1903.

THE CLERK,
LONDON COUNTY COUNCIL.

Sir,—The attention of my Directors has been called to the evidence affecting this Company (of which they enclose an extract from the official shorthand notes) given last week by Dr. Clowes, the Chief Chemist of the Council, before the House of Lords Committee on the Crystal Palace District Gas Company's Bill.

It is a repetition of that given by the same witness in 1900, on the Council's "Portable Photometer Bill," before Mr. Oldroyd's Committee of the House of Commons. From these so-called facts of Dr. Clowes, only one inference can be drawn—viz., that of persistent and deliberate fraud by the Company. The question was dealt with exhaustively by the Committee in 1900, who, after hearing the evidence on both sides, decided against Dr. Clowes' facts and the Council by rejecting their Bill and passing that of the Company, authorizing a reduction of illuminating power from 16 to 14 candles. My Directors submit that, after that decision, the subject should have been dropped. They, therefore, feel bound to protest against its revival last week. But they make no comment beyond comparing the last half year of the 16 candle standard gas, ended June, 1901, with the corresponding half of 1903 with the 14-candle standard gas—these being the two periods referred to in the evidence of Dr. Clowes on the 2nd inst.

	Average Tests. Works. Candles.	Official. Candles.	Enrichment by Petroleum Spirit. Gallons.	Gas Made per Ton of Coal. Feet.
Half Year to June, 1901 . .	16·77	16·58	.. 233,302	.. 9,805
,, ,, 1903 . .	14·70	14·75	.. None	.. 10,690

The abolition of enrichment saved some £20,000 a year, and the increased make of poorer gas per ton adds considerably to the saving—the total being estimated at between £60,000 and £70,000. For the reduction of two candles in the illuminating power, the price of gas was reduced 2d. per 1000 feet—equal to £96,000 a year to the consumers. There is, therefore, a present loss on the transaction of at least £30,000; but this has been made up mainly by the increased value of residuals. If this unenriched and, as we suppose, poorer gas is, as Dr. Clowes says, just as good for the consumers—and they certainly burn no more, and as certainly make the above large saving—the recent opposition of the Council to a reduction of illuminating power was, with equal certainty, not in the interest of the consumers.

The general—I might almost say the universal—satisfaction and good-will of the consumers is the best assurance the Directors can have that their business is conducted fairly, considerately, and honestly, in accordance with their wish, by their officers. They cannot, however, conclude without expressing their great regret that the relations of the Council with the Company are in their present unsatisfactory condition, though, with such an adviser as Dr. Clowes, they are not at all surprised that the misunderstanding exists, to the general disadvantage, but especially of their partners, the consumers.—Your obedient Servant,

(Signed) FRANK BUSH, Secretary.

[ENCLOSURE.]

Crystal Palace District Gas Company's Bill.

EXTRACT *from the Official Shorthand Notes of the 2nd of July*, 1903, *of the Examination-in-Chief of* Dr. CLOWES *on the Crystal Palace District Gas Company's Bill in the House of Lords.*

You heard Sir George Livesey's statement that, in the South Metropolitan Company, although they had nominally* reduced their illuminating power, there was no greater consumption of gas?—Yes.

On that, are you in a position to inform the Committee that Sir George Livesey's idea of reducing illuminating power is erroneous?—I do not agree that he has reduced the illuminating power.

Will you tell the Committee how you know that he has not?—The County Council have been driven by the action taken by Sir George Livesey's Company to make tests which are not strictly statutory in the South Metropolitan Company's district. The Gas Referees—who are the authorities to prescribe the arrangement for methods of testing and the fitting of the station in which the testing is carried out—prescribed that a direct service-pipe should be supplied to our testing-station, the testing-station being in the hands of the Company. The other London Companies fell in with the prescription of the Gas Referees, as they should do, because these are the statutory authorities for prescribing all such arrangements. Sir George Livesey, on behalf of his Company, declined to fall in with these arrangements. The consequence was that the stations in the district——

Lord ROBERT CECIL: I do not want to stop you; but I must warn you that, if you are going to suggest that Sir George Livesey is fraudulently supplying inferior gas to the testing-stations in London, I shall have to ask leave to recall him.—That is not my point. If you will allow me to go on, I think I can explain. Sir George Livesey declined to accede to these conditions prescribed by the statutory authorities; and the consequence was that the Gas Referees declined to certify this station for use. As a result, the County Council, which is compelled by law to carry out the testing in all the different districts, were unable to enter these stations and make the statutory tests. I was directed by the Committee of the County Council to say that they did not wish tests to cease; and in consequence in that district we have used the identical instrument in other places than the statutory place. These places are Board Schools—places where large consumption of gas takes place—and where the gas is constantly therefore being used in quantity. We have made tests in these places by means of this instrument. They have been carried out by gas examiners of the Council, who are the same men who practically do the tests at the stations; and they have been carried out under what I am certain are perfectly satisfactory conditions for fair tests. So that while the gas has professedly been reduced from 16 to 14 candles since the period when the Bill allowed this reduction, we have been making frequent tests in the district of the South Metropolitan Gas Company; and I have put together here the detailed results obtained during that period (the period referred to by Sir George Livesey in his evidence in 1893*—his last six months)—that is to say, when he has avowedly come down to his limit. The detailed results are given, with dates and places; and they run very closely together. The average of them all is 14·24-candle power. That is the candle power of the gas in that district as tested in the various ways in which I, an experienced Examiner, can test it—that is to say, when I am locked out of my testing-station. In the year 1901 I have taken a similar period of six months)—that was before the reduction of the candle power from 16 to 14 took place—the results run similarly close together. They are carried out in precisely the same places, and in precisely a similar way; so that these are precisely comparable. They were done under identical conditions. There the average candle power was 14·68; so that while the Company were avowedly supplying 16-candle gas, our tests in the district gave an average result of 14·68. After they have reduced their candle power, it comes to 14·24. Those are differences such as one gets between one day and another, not infrequently. I have been forced to bring this forward on account of Sir George Livesey's statement that there has been no increase in the consumption of gas.

According to your test condition, there has been no appreciable reduction in the last two years?—Yes. I could give my whole series of tests, but it amounts to that.

From 1901 to the middle of this year, there has been no appreciable reduction of gas?—That is what it amounts to.

And therefore no occasion for anyone to burn more gas in respect of that matter?—Certainly.

Cross-Examination.

I want to go at once to the South Metropolitan Company's testing. Were these tests which you made in 1901 made with a portable photometer?—That is so.

That is the photometer you desired to impose on the Gas Companies of London by your Bill of 1900?—It is the instrument we are using in the station now.

Would you mind answering my question?—It is that; and it is the other. It is the same instrument.

And that Bill was rejected by Mr. Oldroyd's Committee on the opposition of the Gas Companies, who contended that the results obtained from a portable photometer were very unreliable?—We have no knowledge on what grounds it was thrown out. It was thrown out; and the Gas Companies did certainly state that the conditions were not satisfactory. But we had the Gas Referees, who are men of vast experience, present; and they very strongly stated that the conditions were satisfactory.

What experience in gas manufacture have any of the Gas Referees had?—It is not a question of gas manufacture. It is a question of gas testing; and Mr. Harcourt, who gave evidence on that occasion, is a man who has had more experience than anyone in these matters.

The actual official testing of the South Metropolitan gas in 1901 gave a result of 16?—In our stations you mean?

The official testing?—The official testing would give something over 16. That we put in evidence at the time.

Your tests give 14 roughly?—My tests in the district as distinguished from the station.

What is your explanation?—I was asked to give an explanation on that occasion. I refused to give any explanation; but I stated the fact—which I am certain is the fact, and others who worked with me have stated it is the fact also—that the gas supplied to the testing-station was not of the same quality as the gas we were testing outside in the district. That fact was stated over and over again, and never withdrawn by any of us.

Never withdrawn, but strongly denied by everyone connected with the Gas Companies?—Naturally.

You think nothing a gas manager says is worthy of credence?—No; I do not say that. I do not draw any inference at all. I state those facts; and I must leave those facts with the Committee, as I left them with the other Committee. Those are the facts.

The facts that you allege are that a different gas was supplied to the gas testing station to that which was supplied in the district?—I did not say supplied. I said we found a different gas in those places to that in the station. I do not mean to say it was supplied. There may be other ways of doing it.

Your suggestion, in point of fact, is that a fair sample of the gas of the South Metropolitan district was not supplied to the gas-stations?—The gas in the station was different to that in the district. Those are facts.

Is that the spirit which animates the County Council when dealing with Gas Companies?—I do not know what the spirit of the County Council is.

* Sir George Livesey said "actually."

* This should be 1903.

You advise them in gas matters?—Certainly. I am their adviser on testing matters.

And your opinion of the Gas Companies is that they are capable of supplying a different gas at the gas-stations than that which they supply to the consumers?—I do not know what they are capable of doing. I state facts.

And is that your opinion?—I decline to answer that question. I state the facts.

Their Lordships will judge of the animus or otherwise of your views?—There are five or six witnesses here who will be quite prepared to bear out what I say.

Your suggestion is that the same quality of gas is now being made by the South Metropolitan Gas Company as was made in January, 1900?—My statement again is that we have tested in a precisely similar way in the same places by the same testers; and I have given those results. I again wish to state those facts. I do not wish to draw any conclusions from them.

But, you will forgive me for suggesting, do you think it is a fair thing to come and make statements of that kind, and then say, "I am not making any charge against anybody." Do you think that is a very fair way of giving evidence?—I must leave that with you. I think the facts should be put before the Committee, and I put them. I do not wish to say more.

At present, the official testings of the South Metropolitan gas give a quality of 14 candles?—We are shut out of our stations at present. I cannot give you the official tests.

The last official test gave 14?—I have not got it here; but I cannot give you the present test.

Do not you know that four stations are open. Do you think it was fair to suggest that all the stations were shut?—I am not aware I did suggest that to the Committee. These tests were made in the districts where the stations were closed.

I asked you what the official testings were, and you said you could not give them to me because the stations were shut?—I thought you meant the average of the whole district.

Did you? Do you know that they give a value of 14 candles?—My general recollection is that they have been above 14 candles. But, of course, they have been tested by a method which the Gas Referees described as wrong.

The same method, however, as is enforced by the Act of Parliament?—The method enforced by the Act of Parliament; yes.

You say it is a very unfair method of testing. I see your own results give a result of about 14 candles?—But they are made under that unfair method.

Is your method unfair?—It is unfair for 14 candles, because we have been using 14-candle gas in 1901 as in 1903, and have tested by precisely the same method, which is a wrong method.

You suggest that there has been no reduction of illuminating power in South Metropolitan gas from 1901 to 1903?—I quote these results.

Is that what you wish the Committee to understand?—Here are the results.

Is that what you wish the Committee to understand?—You must draw your inference from them.

And yet the South Metropolitan Gas Company have reduced the price of gas by 2d. Do you know that?—I believe so.

And do you seriously suggest to the Committee that this Gas Company, who are capable of all the frauds you have insinuated, are yet such philanthropists that they are prepared to supply the same gas as they did in 1901, at 2d. cheaper?—If they were supplying 14-candle gas in 1901, it ought to have been reduced by 2d. long ago. Of course, I make these tests with a full consent of responsibility. I am not a private Examiner in any way. I am simply acting in the public interest.

Was any representative of the Gas Company present at any one of the tests that you carried out in this list?—They were not.

Under the statute, they are entitled to be present?—They very seldom are; but they are entitled to be present.

THE SOUTH METROPOLITAN PROFIT-SHARING SCHEME.

The Chairman of the South Metropolitan Gas Company (Sir George Livesey) has lately sent to the men an address on the occasion of the fourteenth annual profit-sharing. He begins by pointing out that no scheme or device of man can last unless it is right in principle and answers its purpose in practice. But he is perfectly convinced that profit-sharing is right, inasmuch as it is a step in the direction of partnership. It makes slow progress, however; and sometimes, after a short trial, it is given up as a failure. This is due in most cases to want of interest shown by the workmen, who fail to realize that, unless they respond in the right spirit, they cannot expect their employers to expend thought, time, and money on their behalf. "To be a lasting success, any scheme of profit-sharing must be a benefit to both parties to the bargain." Sir George was induced to commence his address with these observations because one of the offspring of the scheme he originated—that of the Richmond Gas Stove and Meter Company, Limited—had come to an untimely end. It did little good to the men, and none to the Company; the large amount paid out every year producing no return in the shape of better work. Men who do not take an interest in their business, and constantly draw out their bonus and sell their stock, get no lasting good from profit-sharing; and it is such men as these who cause schemes to fail. In the South Metropolitan Company, it has been necessary to stop the bonuses in certain cases from this cause. However, they are year by year becoming fewer. Last year the withdrawable half of the bonus amounted to £12,305, and £1719 of it, or 14 per cent., was taken out in the first month. Two years previously, out of the half bonus of £12,434, £3953, or 31¾ per cent., was withdrawn. This is a most encouraging improvement. In fact, at one station, the withdrawals last year amounted to only 15½ per cent., against 43¾ per cent. in 1900; at another, they were 18½, against 36½. There was a very conspicuous drop in the case of the officers—3 per cent. against 27¼ per cent. Sir George considers this general improvement due largely to the influence and example of the great proportion of earnest and thoughtful profit-sharers at all the stations, and not least to the Honorary Secretary (Mr. Sims), who is worthily assisted by the officers who work the system at the various stations. Nor must the Profit-Sharing Committee be forgotten, for much of the success of the scheme is due to their loyal co-operation with the Directors. Generally speaking, so far from feeling anything approaching dissatisfaction or disappointment, Sir George is "surprised and delighted to find so very large a proportion as 80 per cent. or more of the Company's employees have availed themselves of the opportunity to become men of property." At the first distribution in 1890, about 45 per cent. of the bonus was saved. He does not think it too much to hope that this year it will exceed 90 per cent. The Company's experience proves that English workmen are not so thriftless as is commonly supposed. All that is necessary is to give them the opportunity, and make some effort to induce them to take advantage of it, and they will respond in the right spirit. Nearly all the men in regular employment by the Company are shareholders; a large proportion having considerable amounts—£30, £40, £50, and many as much as £100 and upwards—invested in the ordinary stock.

Sir George closes his address with a few observations on the relations of employers and employed in the early times and now, and shows the great part profit-sharing may take in the advance of those who work for hire to the ultimate position of partners in the businesses in which they are engaged. At the dinner of the Iron and Steel Institute in May, the Duke of Devonshire, referring to the Company's scheme, characterized it as "great and beneficent:" and Mr. Carnegie sent Sir George the following message: "You are on the right lines, sure." He therefore asks all who participate in the profit-sharing shareholding system to look at it in this light, and to determine that they will do what they can to make it such a success that they will derive not only great personal benefit, but also, by that success, be the means of leading many others to follow the example, and thus help to "lift the working classes to the position of partners in industry, and give them a share in the wealth and prosperity of the country."

NEW GASHOLDER AT SYDNEY.

On Thursday, the 4th ult., the Deputy-Chairman of the Australian Gaslight Company (Mr. S. Dickinson), in the presence of several Directors, the Secretary (Mr. R. J. Lukey), and the Engineer (Mr. T. J. Bush), formally brought into service the new gasholder which has lately been completed at Rushcutter Bay, in order to increase the supply to the eastern suburbs of the city. The holder, which works in a steel tank, 104 feet in diameter and 25 feet deep, is in two lifts, respectively 100 feet and 102 feet in diameter and 25 feet deep; and it has a capacity of 400,000 cubic feet. The tank contains 1,300,000 gallons of water, weighing nearly 6000 tons. The tank and holder were supplied by the Barrowfield Iron-Works, Limited, of Glasgow; and they were erected under the personal supervision of Mr. Bush. The gas is manufactured at the Company's chief station, and forced through a new 12-inch main to Rushcutter Bay by means of Sturtevant fans driven by Otto gas-engines. Upon the site, which is 1 acre 17½ poles in extent, is a neat cottage, affording comfortable quarters for one of the Company's employees. In this building is fixed one of Messrs. W. & B. Cowan's governors, controlling the supply to the district, about which there have latterly been complaints. The total outlay on the extension, inclusive of the additional main, has been about £20,000.

Gas Suffocation Case at Cottingham.—An inquest was recently held at Cottingham on the body of Mr. James Cattle, an insurance agent, who was found dead in a chair in his office. There was a smell of gas in the room, and the tap of a small stove was found to be turned on, though the gas was not alight. Dr. Watson stated that the cause of death was poisoning by gas. From the position of deceased, he thought it was very probable that the stove had been lit and had then gone out, or by some means the tap had been accidentally turned on. Addressing the Jury, the Coroner said the position in which deceased was found disposed of the idea that he had turned on the gas for the purpose of taking his life. Either the gas had been lit and had gone out—as they had been told it had often done before—or by some means the tap had been accidentally turned on and the deceased suffocated. A verdict of "Accidental death by gas poisoning" was returned.

Gas-Testing in West London.—At a meeting of the Hammersmith Borough Council last Wednesday, a letter was received from the Honorary Secretary of the Joint Committee of the Local Authorities supplied by the Brentford Gas Company, formed for the purpose of arranging for periodically testing the gas supplied by the Company. From the minutes forwarded of the proceedings of a meeting of the Committee held on the 22nd ult., it appeared that the Urban District Councils of Heston and Isleworth and Brentford had withdrawn from the scheme; and it was suggested that the subscriptions in future should be as follows: In the case of Hammersmith, Acton, and Chiswick, £15 15s. each; in the case of Twickenham, £6 6s.; and in the case of Hanwell, £3 3s.; each Council being entitled to tests to the amount of their subscriptions, according to the scale agreed with the Gas Examiner—the charge for testing illuminating power being £1 1s. for each test. The Lighting Committee reported that the Council had provided a photometer at the Town Hall for the use of the Gas Examiner, but during the past year only one report had been received that an examination had been made; whereas, in accordance with the subscription of £10 10s., the Council were entitled to ten tests. The Committee expressed the opinion that the advantage accruing to the borough from membership was not such as to justify the payment of so high a subscription as £15 15s.; and they therefore recommended that the Council withdraw from the scheme. This was agreed to.

EUROPEAN GAS COMPANY, LIMITED.

The Annual General Meeting of this Company was held last Tuesday, at the London Offices, Finsbury House, Blomfield Street, E.C.—Mr. R. HESKETH JONES presiding.

The SECRETARY and GENERAL MANAGER (Mr. W. Williams) read the notice convening the meeting, and afterwards the Directors' report and the statement of accounts. The report was as follows:—

The Directors are able to report that the business of the Company has been well maintained during the past financial year; the aggregate increase in the consumption of gas at the seven stations being at the rate of 2 per cent.

The cost of coals has been less during the period under review than during the previous twelve months; but the revenue from coke shows a serious falling off, while an improvement in the return from sulphate is balanced by a decline in the return from tar.

The concession for lighting the town of Caen has been extended twelve years, and consequently will not expire until 1941. The Company have also obtained a contract, running until 1934, for lighting the Commune of Rivery, one of the suburbs of Amiens.

The Directors recommend the payment of the usual dividend of 20s. per share on the fully-paid shares, and 15s. per share on those £7 10s. paid, less the interim dividend of 8s. and 6s. per share respectively paid on the 31st of January last; also that a bonus of ½ per cent. be paid on all shares according to the amount paid thereon, subject, however, to a deduction for French stamp and transfer duty of 1s. 1d. per fully-paid share, and 10d. per share £7 10s. paid in respect of all shares held in France.

Notice has been given that two Directors (E. F. White, Esq., and N. E. B. Garey, Esq.) and both Auditors (J. Reeson, Esq., and F. M. Fry, Esq.) retire from office at this meeting; but, all being eligible, they offer themselves for re-election.

The CHAIRMAN, in proposing the adoption of the report and accounts, said he might congratulate the shareholders on their possession of such a valuable concern as the European Gas Company. Their investments, if converted into hard cash, would realize sufficient to return to the shareholders 43 per cent. of the par value of their shares. He did not think many gas companies were in this enviable position. The profits during the past year were more than sufficient for the dividend and bonus which the Directors proposed to pay—in fact, they had £1069 to spare, which would be added to the undivided profits. Three years ago the concessions averaged a duration of 25 years. On March 31 last, the Company's concessions, instead of being reduced to 22 years, had been increased to 28 years; and, in all probability, within a few weeks, or it might be days, this average would be increased, for the Directors were in daily expectation of prolonged concessions being granted in two of the towns the Company lighted with gas—in fact, they only waited the confirmation by the Government authorities of the terms agreed upon between the two Municipalities and the Company. As a matter of course, in all these negotiations for prolongation of concessions, the Company had to submit to reduced prices for gas, and additional outlays for mains and lamp outfits. These were points which had been very carefully considered by the Board. Their experience had shown that increased business invariably followed a reduction in the price of gas; and it was highly desirable that the public lighting of the towns supplied by the Company should be effective and satisfactory. By way of illustration, he might mention that, from a letter to hand the previous day, their Manager at Amiens reported that the June consumption was 45 per cent. in excess of June, 1901, due to the stimulating effect of a reduction in the selling price of gas. With regard to the coal-tax, he (the Chairman) should like to call attention to what fell from the lips of the Chancellor of the Exchequer a short time since in the House of Commons, from which they might anticipate that, instead of paying, as they now did, £6000 a year for coal-tax, they might be wholly, or to a great extent, relieved from this tax, which fell entirely on the shareholders and not on the consumers of gas in France. It might not be uninteresting to state that, in addition to the English tax of 1s. a ton, the Company paid *octroi* to the municipalities averaging 2s. 10d. a ton—in other words, their raw material was taxed to the tune of 4½d. per 1000 cubic feet. Hence the comparatively high prices for gas on the Continent. During the past year, the business of the Company had but slightly increased in volume; but there had been an increase of 3632 consumers—1100 of these being on the prepayment system. There had also been an increase in the use of gas-engines. Last year these engines represented 3474 horse power, against 2836-horse power in the previous year, or an increase of 22 per cent. He was happy to say that the Company had had no trouble with the workmen. They were not unmindful of the men's wants. They contributed to their sick funds; and thus encouraged thrift. Pensions were also granted to those who had served the Company faithfully; and last year the pensions amounted to £2590, which was about 6s. 8d. per cent. on the paid-up capital of the Company. Regarding the several stations, and taking them alphabetically, special attention was being given to Amiens and Bolbec, where the leakage had been high. At Amiens, it had been reduced during the past two years by nearly 4 per cent., and at Bolbec by 5 per cent. It might be of interest to allude to the fact that the old part of the city of Amiens was situated on very low ground. It was a series of small islands, formed by the eleven streams into which the river was divided; and these islands were connected with each other by several small bridges, over which the gas-pipes were laid at shallow depths, so that one could not expect Amiens to show the same percentage of leakage as in the five larger towns supplied by the Company. The present Manager was exerting himself to improve both the carbonizing and distribution of gas, and had quietly introduced a better organization of the staff under him. The increased consumption of gas in this town during the past year had been 17 per cent.; and by the introduction of gas-stoves and engines, the day consumption from sunrise to sunset was now 36 per cent. At Bolbec, a coke-breaking machine had been introduced. All the consumers' meters there would have been tested by the end of this month; and further reductions in leakage might be safely anticipated. The increased consumption of gas in this town had been 11 per cent.; and the day consumption had been raised to 41 per cent. He might group the five stations of Boulogne, Caen, Havre, Nantes, and Rouen, and say that, in all of these towns, the Managers were doing their work nobly. There was a friendly rivalry among them to see which would show the best results. During his (the Chairman's) inspection of the stations a few weeks since, he found all of them in excellent order, and great intelligence being displayed in the conduct of the Company's business. The average leakage at the five stations was 7 per cent. Nantes had improved its consumption by 5¾ per cent.; Boulogne by nearly 5 per cent; Havre had remained stationary owing to the depression of trade in that town; while Caen and Rouen show slight reductions, due to the introduction of incandescent gas-burners for public lighting. The day consumption was 55 per cent. at Nantes, 43 per cent. at Caen, 36 per cent. at Havre and Rouen, and 29 per cent. at Boulogne. The average sales of gas per ton of coal carbonized compared very favourably with the best managed gas undertakings in England or on the Continent—in fact, very few gas companies could show such good results in this respect as the European Company. He was afraid he had somewhat wearied the shareholders with figures; but the study of statistics was very essential in the conduct of their business.

Mr. N. E. B. GAREY seconded the motion.

Mr. G. ACTON DAVIS, who had been a shareholder twenty years, but had never attended a meeting before, asked for a little light upon matters which were, in consequence, strange to him. With regard to depreciation, redemption, and insurance, he wanted to know whether they had increased since last year; and if so, to what extent. Also whether there was any fixed principle upon which the allocation of the fund was made before the question of profits was considered. As to the capital expenditure, he inquired whether there had been any increase during the year, and to what amount. He also applied the same questions to the invested reserve fund.

Mr. W. GATENBY also made an inquiry as to the increase of the depreciation and reserve funds. It seemed to him that, unless they largely increased these funds, they would—at the end of the concessions, or in the event of the Company being wound up—go short of the £20 many had paid for their shares. Of course, if the Company were certain of going on in perpetuity, it would not matter.

The CHAIRMAN, replying to the last speaker first, said that during the past year the investments had been increased by £20,166. As to the expenditure of capital, the capital account had not actually been increased. The total amount placed to capital account was only £824; and this consisted partly of working capital and partly of fittings at a rental, which were being redeemed year by year, and would be written off in excellent time. He might say with reference to the investments, if they could continue to add to these at the rate of the past year, they would have a superabundance of capital at the end of their concessions. He had gone into this matter very carefully himself; and he found, if they could invest something like £12,000 a year, they would be all right at the end of the several concessions. They had exceeded this sum in the past year; and therefore he considered the Company were in a most satisfactory position in this respect. They had adopted a fixed principle in computing the amount which should be set aside for the redemption of the capital.

The motion was unanimously carried.

On the proposition of the CHAIRMAN, seconded by Mr. GAREY, a resolution was passed in the terms of the recommendation in the report as to dividend and bonus.

Proposed by the CHAIRMAN, and seconded respectively by Mr. H. E. JONES and Mr. H. C. SMITH, the retiring Directors (Mr. E. Felix White and Mr. N. E. B. Garey) were re-elected. Subsequently, on the motion of Mr. A. T. EASTMAN, seconded by Mr. ARTHUR SKAIFE, Mr. J. Reeson was re-appointed an Auditor, as was also his colleague (Mr. F. M. Fry), on the motion of Mr. H. D. ELLIS, seconded by Mr. GATENBY.

The CHAIRMAN said, before parting, he wished to propose that the cordial thanks of the shareholders be passed to their Managers abroad, to the Secretary and General Manager and staff in London, and last, but not least, to the workmen on the Continent, because really to them the Company were much indebted for the results of the year. He proposed this with very great pleasure, as he had recently visited all the stations, and found everything so quiet and nice that it was indeed a great pleasure to him to make the visits. It was extremely unpleasant for a Director to go into a gas-works where everything was in confusion, and have to point out the defects. But in the case of the European Company, they had met with such cordial co-operation from their Managers and men, that he had really had nothing in the nature of a complaint to make.

The motion was seconded by Mr. GAREY, carried unanimously, and responded to by Mr. WILLIAMS.

Moved by Mr. EASTMAN, and seconded by Mr. G. C. GOLDSMID, a cordial vote of thanks was passed to the Chairman and Directors for their conduct of the business during the past year. Mr. Eastman remarked that, from the report and the Chairman's explanatory statement, the year seemed to be almost an abnormal one, notwithstanding the various difficulties with which they had had to deal. The Directors had been successful in prolonging the life of the Company, and they had adopted a policy which, although the prices of gas were reduced, seemed in the long-run to bring in a larger net revenue.

The CHAIRMAN, on behalf of himself and his colleagues, thanked the shareholders for their exceedingly kind appreciation of their work.

The proceedings then terminated.

SEVILLE WATER-WORKS COMPANY, LIMITED.

The Annual Meeting of this Company was held on Thursday last. The Secretary (Mr. J. M. Hamilton) read the notice convening the meeting; and the report and accounts were then presented. These showed that the year's income amounted to £29,964. After deducting working expenses, cost of laying on services, and the "service" of debentures, the net profit was £2052. To this was added the unappropriated profit at March 31, 1902—viz., £9732; making the amount

standing to the credit of profit and loss account £11,784. The Directors recommended a dividend of 2 per cent. on the share capital, absorbing £5422, that £2500 be written off the expenses in connection with the conversion of the debentures, and that the balance of £3861 be carried forward. The Chairman (Mr. Cowley Lambert), in moving the adoption of the report and accounts, referred to the resignation from the Board of Mr. William Blaber, who had been a Director upwards of 17 years. During the whole of that period, he had acted in a most loyal and friendly way towards his colleagues; and he (the Chairman) was sure they all greatly regretted that their respected friend had been compelled to sever his connection with them—more especially in view of the cause being his failing health. As to the water-rentals, the increase had been steady and satisfactory; and besides this there had been a decrease in the expenditure. The latter, however, was still abnormally heavy, owing to the additional supply of water which the Company had to obtain, and the discounts the Directors thought right to allow the consumers, during the period of drought. He hoped the expenditure would be greatly reduced during the present year; and he thought that, if only they could get some improvement in the rate of exchange, the shareholders might consider themselves in a very satisfactory position. New works at Otivar had been finished, and the water was now being carried into Seville; but they were continuing capital expenditure there in order to increase the amount of water which they hoped to get from that source. The Company had carried out all their obligations with the Municipality under the Deed of Transaction, and had requested them to hand over the waters of Santa Lucia. He regretted to say, however, that the same spirit of hostility of which he spoke at the last meeting still existed; and obstacles were constantly being put in their way to prevent them carrying out what was their desire—to give to the people of Seville a constant and efficient supply of water. Negotiations were still in progress with the Municipality; and he could only earnestly hope that all matters of difference between them would be soon and amicably settled. The motion was seconded by Mr. F. S. Jackson, and carried unanimously. Moved by the Chairman, and seconded by Mr. Easton Devonshire, the recommendations of the Directors as to the disposal of the balance at the credit of the profit and loss account were agreed to. The re-election of the retiring Directors and the Auditors concluded the proceedings.

EDINBURGH AND LEITH GAS COMMISSIONERS.

The Annual Accounts.

The accounts of the Edinburgh and Leith Gas Commissioners for the year ending the 15th of May have just been issued, accompanied by an abstract by the Treasurer, Mr. John S. Gibb. It contains the following statistics:—

The gross surplus on the year's working is			£82,486 11 6
There has been paid during the year—			
For Edinburgh and Leith annuities .	£32,085 8 10		
,, Edinburgh-Portobello gas annuities	1,109 18 0		
,, Amount transferred to sinking fund in respect of annuities redeemed .	2,004 13 2		
,, Do. in respect of mortgages redeemed	636 18 0		
,, Interest on mortgages, &c. . . .	28,005 1 5		
,, Expenses of mortgages	516 1 2		
		64,358 0 7	
Showing a net balance on the year's working of . .		£18,128 10 11	
This being added to the amount brought forward from 1901-2, after deducting contributions to sinking funds		2,753 2 8	
Leaves at the credit of the profit and loss account . .		£20,881 13 7	
This is subject to the statutory minimum charges for the sinking funds as follows:—			
(1) For repayment of money borrowed (20s. per cent.)	£8,837 5 6		
(2) For redemption of annuities (15s. per cent.)	7,023 12 5		
(3) For reserve fund (Commissioners' Gas Order, 1902, sec. 9), ¼ per cent. on £104,497 10s. 4d. . .	261 4 10		
		16,122 2 9	

This being deducted from the above sum, leaves a balance of £4759 10 10, which may be dealt with at the discretion of the Commissioners in terms of their Act.

Mr. Gibb explains that the foregoing statements as to the sinking funds are made on the basis of charging the minimum percentage prescribed in the Commissioners' Acts. The period during which an option might be exercised as to the contribution to the sinking fund for the new works at Granton has now elapsed, and the minimum rate at least must be charged. He adds that 30 million cubic feet more gas were sold last year than in 1901-2; but the revenue from gas is less by £14,000, resulting from the lowering of the price last October by 4d. per 1000 cubic feet. Fortunately this shrinkage has been more than made up by the very gratifying increase of £15,500 from residual products, and by the substantial decrease of £20,000 in the cost of coal, oil, and other manufacturing charges. Rates and taxes have increased by £4700, owing mainly to the larger valuation of the Commissioners' property, based on the annual profits. The expenditure for capital purposes is now about covered by mortgages, as the Acts intended. This has increased considerably the charges for debenture interest; but has diminished the ordinary interest account.

The capital account is divided into the two classes of stock and loan capital. The stock capital consists of £200,000 of stock of the Edinburgh Gaslight Company, £150,000 of stock of the Edinburgh and Leith Gaslight Company, and £20,000 of stock of the Portobello Gaslight Company, Limited—making together £370,000. The annuities payable upon this sum amounted to £35,200; but annuities to the amount of £2012 have been redeemed, reducing them to £33,188. The redeemed annuities represent £21,335 of capital wiped out, reducing the stock capital account to £348,665. The loan capital authorized amounts to £1,400,000. Of this sum, £876,702 has been borrowed upon mortgage, and £7025 received upon deposit receipts for fixed periods. Mortgages have been redeemed out of the sinking fund to the amount of £20,770, to which amount, according to the Commissioners' Act of 1888, their borrowing powers are cancelled; and the sum available for borrowing is left at £495,503. The additions to capital during the year are stated at £87,256, of which £75,352 was upon the works at Granton; raising the entry against the new works to £573,649. Other outlays entered in the capital account were £10,236 upon main and service pipes and the cost of laying; and £1668 upon gas-meters. On the other hand, the gas-works in Leith were reduced in value by £1617, and those in Portobello by £30; and the capital value of gas cooking and heating stoves was reduced by £1979. The net addition to the capital account during the year was thus £83,630. The total capital account stands at £1,290,000.

The revenue in the past year amounted to £329,052. Of this sum, £277,249 was received for 1,803,064,000 cubic feet of gas sold, £14,184 for coke, £20,588 for tar and ammoniacal liquor, and £16,468 as the return from sulphate of ammonia, after deducting working expenses and repairs and maintenance of chemical works and plant. The expenditure amounted to £246,566, which leaves a gross balance of £82,486. The manufacture of gas cost £183,214. Of this sum, £108,581 was expended upon 164,976 tons of coal; £7619 upon 3835 tons of oil for the carburetted water-gas process; £10,891 upon purifying materials, oil, water, and sundries used at works; £43,664 upon salaries and wages; and £12,459 upon repairs and maintenance of works and plant. Distribution of gas cost £29,651, of which £11,908 was for salaries and wages, £7570 for repairs and maintenance of pipes and attendance at gasholders, £7483 for repair and maintenance of meters, and £2690 for repairing and fitting up gas-stoves. Management cost £9783, of which £2014 was for salaries and wages in the Treasurer's Department, £3532 for salaries and wages in the Collector's Department, and £4236 for general establishment charges, travelling expenses, insurance, printing, stationery, &c. Feu duties amounted to £362, rates and taxes to £12,130, pensions to £450, allowances to old employees and representatives of deceased employees to £542, allowances to families of reservists to £45, law and parliamentary expenses to £1967, accidental damages to £61, and discounts, abatements, and bad debts to £8360.

The sinking fund for repayment of borrowed money is stated as having amounted to £37,797; but £20,770 has been expended in repayment of mortgages—leaving the fund at £17,027. The sinking fund for the redemption of annuities is stated at £153,344; but £58,912 has been expended in redemption—leaving the fund at £94,431. The total of the sinking funds is £111,459. This sum is invested to the amount of £93,100 in mortgages over heritable property; and the balance of £18,359 is banked on deposit receipt.

The profit and loss account brings out, as shown in the statement of the Treasurer, a balance of £20,881.

The gas-stove account shows, on the expenditure side, a sum of £22,267, which is made up of £17,231 as the value of stoves, &c., on hand or lent on hire on May 15, 1902; £2100 as the cost of stoves, &c., purchased during the year; and £2936 as the expenses of repairing and fitting up stoves, &c. On the other side, the amount received for hire is stated at £3164; for sales, at £915; for fitting up, at £246; and a deficiency on fittings, to the amount of £2689, is charged to revenue account. These sums come to £7015, and leave a balance of £15,252 as the value of appliances on hand or lent on hire at May 15 last.

The accounts were before the Commissioners, sitting in Committee, on the 13th inst., and were approved. They will be submitted in public at the first monthly meeting of the Commissioners.

BRADFORD CORPORATION GAS SUPPLY.

The Year's Working.

At the Meeting of the Bradford City Council last Tuesday, Alderman Hind, the Chairman of the Gas Committee, submitted a statement showing the result of the year's working of the Corporation gas undertaking. It would, he said, be in the recollection of the Council that an arrangement was made last year that the Finance Committee should contribute a certain sum towards the cost of street lighting, and that the price of gas should be reduced 3d. per 1000 cubic feet in consequence. It was therefore estimated that there would be a very considerable loss on the year's trading. With careful management and better prices for some of the residuals, however, the anticipated loss had been turned into a profit. The North Bierley district had now formed part of the Corporation gas undertaking for three years; and the accounts had been put together since 1901. For the purpose of analysis and comparison, however, the costs of working had as far as possible been kept separate this year. Dealing first, then, with the Bradford and North Bierley portion of the undertaking, and excluding Clayton, Eccleshill, and Idle, the working results for the year ending March 31, compared with the previous year, showed an improvement in almost every detail. Coal had cost £103,654; being a decrease of £11,150. Public lighting had cost during the year £30,562, only £17,850 of which had been repaid by the Finance Committee, leaving £12,712 to be borne by the Gas Department. The revenue from the sale of gas was £170,709, or a decrease of £12,334; but it had to be remembered that the reduction of 3d. per 1000 cubic feet during the year represented about £18,000 on the quantity of gas consumed. The income from the sale of coke was £1384 less; but tar produced £2378 more, and the revenue from ammoniacal liquor and chemicals had increased by £3300. The gross or trading profit on the gas undertaking (excluding Clayton, Eccleshill, and Idle) was £51,888, as against £25,886 a year ago, or more than double. The Clayton accounts for

the year to March were compared with those for the twelve months ending Dec. 31, 1901—which was the last year for which the accounts were made out—and they showed a gross profit of £4622, or only £184 less than in 1901, though the reduction in the price of gas in Thornton and Allerton amounted to £1241. This reduction did not include the 3d. per 1000 cubic feet taken off on account of the partial payment made to the Committee for street lighting, which represented £465 more. On the Eccleshill undertaking, there was a gross profit of £1217; being less than the year 1901 to the amount of £923. The reduction in the price of gas in Eccleshill is equal to £1067; and the 3d. per 1000 cubic feet for lighting, £291 more. For the Idle portion of the undertaking, the gross profit was £1167, or £1562 less than in 1901. The reduction in the price of gas in Idle was equal to £1269; and the 3d. per 1000 cubic feet for lighting, £423 more. In addition, the Committee had reduced the price of gas in Heaton to the extent of £322. To sum up, after paying for all charges for interest, sinking fund, and income-tax, the net result for the year to March showed a net profit of £15,863 upon the old portion of the gas undertaking. The net loss on the North Bierley portion was £4579; but the gain to the district in the lower price of gas was £3386, and the 3d. reduction for lighting over £1000 more. The net loss on the Clayton portion was £2204, on the Eccleshill portion £1848, and on the Idle portion £2109—or a total loss on the new works of £10,740; leaving a clear net profit upon the whole undertaking of £5123, which was £17,000 better than was anticipated a year ago. The gross trading profit on the Bradford and North Bierley portion was £51,888, and on the Clayton, Eccleshill, and Idle portion £7006—or a total on the whole of the Corporation gas undertaking of £58,894. In addition to the trading profit of £58,894, it must be remembered that the actual benefit to consumers in the reduced price of gas in the added districts was £7287. The greatest trading profit made by the Gas Department was in 1880, when it amounted to £59,279; but then the price of gas was 3s. per 1000 cubic feet, as against 2s. 3d. last year. Taking everything into account, it might be claimed, therefore, that the past year had been one of the most satisfactory in the history of the undertaking. A very encouraging feature was the rapid increase in the sales of gas in the added districts. In North Bierley, during the three years the Corporation had had possession, the sales had increased nearly 36 per cent., with the result that last year, after paying sinking fund and interest, and allowing for the benefit to consumers, the Committee were only £174 short; and they would certainly next year show a clear net profit. It was not too much to assume that the same rate of increase would follow in Eccleshill, Idle, Thornton, Allerton, and Heaton, because the greater portion of the remarkable increase in the North Bierley area was undoubtedly due to the reduced price of gas. In conclusion, he might say that, though the net profit of £5123 for the past year was not a large one, it was a very satisfactory result, considering that it was estimated a year ago that there would be a loss of more than double this amount; and it was a great relief to the Committee to be freed from the unpleasant necessity of having to advance the price of gas. They had the assurance of the Chairman of the Finance Committee that an additional sum would be paid towards the cost of public lighting; and if this were done, the Gas Committee would make a corresponding reduction in the price of gas.

STAFFORD GAS AND ELECTRICITY SUPPLY.

Annual Report and Accounts.

The Gas and Electricity Committee of the Stafford Corporation have presented their report on the working of the undertakings in the year ending the 31st of March. We learn therefrom that the total quantity of gas manufactured was 174,083,000 cubic feet, of which 153,961,960 cubic feet were sold to private consumers, compared with 151,630,250 cubic feet during the previous year. The leakage and unaccounted-for gas was 4·16 per cent., which is a material reduction on that of the previous year. The cost of coal and other materials was £9677 12s. 6d., against £11,606 4s. 2d.—showing a decrease of £1928 11s. 8d.; while the total manufacturing charges amounted to £4551 13s. 3d., which also shows a decrease on the previous year of £133 3s. 7d. Distribution charges for the year amounted to £1201 13s. 9d.—an increase of £282 18s. 1d.; and rates and taxes are higher by £204 19s. 11d. The expenditure in connection with management amounted to £508 11s. 9d., as compared with £561 8s.; and the total payments for coal and working expenses for the year came to £18,276 8s. 5d., or a decrease of £1460 11s. The receipts for gas show an increase of £434 7s. 6d.; but the amount derived from the sale of residual products was less by £68 12s. 8d. The total revenue for the year amounted to £28,366 11s. 3d. The expenditure having been £18,276 8s. 5d., there is a gross profit of £10,090 2s. 10d., or £1913 4s. 8d. more than for 1901-2.

After deducting from the gross profit a contribution to the depreciation fund of £1129, interest on loans £2565, repayment in reduction of loans £3404, bank interest £644, and income-tax £463, and after adding the balance brought forward from last year, there remains a net sum of £2022 standing to the credit of the profit and loss account. Out of this sum, £750 was paid as an instalment to the district fund in September last; and the Committee recommend that a further sum of £750 be transferred to the fund in reduction of rates (making £1500 for the year), that £500 be transferred to a reserve fund, and the balance carried forward. The total amount paid out of the profits in reduction of the rates, including the contributions in respect of the past year, is £38,825.

In presenting the accounts of the Electricity Department, the Committee pointed out that very material savings in the working expenses were effected in the past year. The total revenue from all sources amounted to £3096 12s.; being an increase of £141 compared with that of the preceding year. The total expenditure was £1607—a decrease of £685. The gross profit was therefore £1489, or £826 7s. more than before. Interest charges and prepayment of capital amount together to £1841, and, in addition, the Committee have decided to place £434 to the depreciation fund for the renewal of cables, and £200 to the same fund to meet renewals to the battery. This will leave a debit balance on the year's working of £986, which, after giving effect to the contributions from the rates last year, leaves a deficiency of £1647.

Following the report are the accounts of the two departments, in the usual forms, and appended thereto are analyses by the Engineer and Manager (Mr. Hubert Pooley, Assoc.M.Inst.C.E.). He shows that the quantity of gas made per ton of coal carbonized last year was 9964 cubic feet, of which 9425 cubic feet were sold, or 94·59 per cent. of the make. The coke sold per ton of coal carbonized was 9·01 cwt.; tar, 11·7 gallons; sulphate of ammonia, 19·8 lbs. The net proceeds of the residuals on the cost of coal came to 56·6 per cent. The total working expenses were equal to 9s. 2·25d. per ton of coal carbonized and 11·69d. per 1000 cubic feet of gas sold; the gross profit was 11s. 6·61d. and 14·71d.; and the net profit (including last year's balance), 2s. 3·78d. and 2·95d. With regard to the Electricity Department, Mr. Pooley shows that the capital outlay per kilowatt capacity is £63. The total current generated in the past year was 290,915 units, of which 224,816 units were sold to ordinary consumers, 7878 units for public lighting, and 19,460 units were used on the works; the quantity not accounted for being 38,761 units. The sale of current produced £3030 4s. 10d., or at the rate of 3·13d. per unit sold; the total revenue being £3096 12s., or 3·19d. per unit, and the working expenses £1607 1s. 1d., or 1·66d. per unit. The revenue per kilowatt capacity of the plant was £7 15s. 7d.; the working expenses were £4 0s. 9d.; and the proportion of the latter to the gross revenue was 52 per cent.

COST OF CONTRACT AND CORPORATION WORK.

An interesting discussion on the relative merits of direct and contract work in connection with municipal water undertakings took place at the last meeting of the Bradford City Council, over a recommendation of the Water Committee that an advertisement should be issued inviting tenders for the construction of a reservoir at Angram. The adoption of the minutes having been proposed and seconded, Mr. Jowett moved, as an amendment, that the Committee should be instructed to undertake the work by directly employed labour. He said that Sir Alexander Binnie had himself recommended that such work should be carried out by directly employed labour. The contractors were a close corporation, and there was little competition; so that if this were done the cost would probably be less. Mr. Spencer considered that the discussion was the most important one that had been raised in the Council for years, since the amendment, were it carried, would mean that the Water Committee would be instructed to take upon themselves a contracting job of £300,000. A most instructive test of the relative advantages of direct and contract work was furnished by the experience of Liverpool and Manchester in their large water-works undertakings. The Liverpool Corporation constructed their great reservoir at Vyrnwy by direct employment; but the Manchester Corporation made their Thirlmere reservoir by letting the work out to a contractor. He had it on the authority of one of the most distinguished water-works engineers in the kingdom that the conditions were as nearly as possible alike. If anything, Liverpool had the advantage, since the granite needed for the dam was obtained on the spot; whereas the stone facing for the Thirlmere embankment had to be brought from a considerable distance. Yet the cost of the Liverpool embankment was something like 60 per cent. per cubic yard more than that of the Manchester one. Alderman Milner, the Deputy-Chairman of the Water Committee, stated that to carry out the work in the same manner that Birmingham were doing theirs would make a difference of £100,000 in the cost. For one thing, the Corporation would have to buy expensive machinery and plant, which would be of no use to them after the work was finished. On the suggestion of Mr. Smith, the amendment was altered so as to simply refer the minute under discussion back to the Committee for further consideration; but even in this modified form it was defeated by a large majority.

Gas Profits at Cleckheaton.—The Cleckheaton Gas-Works yielded a gross profit of £3473 for the year ending March 31, as compared with £2857 in the preceding twelve months. To this amount has to be added £600, the estimated cost of public lighting, for which no charge is made.

Incandescent Gas Lighting in Colombo.—We learn from Mr. S. N. Wellington, the Secretary and Manager of the Colombo Gas and Water Company, Limited, that the Company have just received another order from the Colombo Municipal Council to extend the incandescent gas lighting. The new contract is for 8 miles of 4-inch main and 300 lamps (by Pintsch, of Berlin) of 60-candle power each. The Company have already fitted close upon 2000 of these lamps, besides laying 10 miles of new main (3 and 4 inch) previous to the order just received.

Public Lighting of Sydney.—The Government of Sydney (N.S.W.) have for some little time had under consideration a scheme submitted to them by the Australian Gaslight Company for lighting two public places known locally as the Outer Domain and Hyde Park. It appears that only £1200 had been allocated for the purpose; but the Directors in their anxiety to do something for the welfare of the community, decided to meet the authorities in a liberal spirit. At present Hyde Park is supplied with 75 ordinary lamps of 70-candle power. The Company purposed increasing this number by 60 ordinary lights, each of 70-candle power, and 6 Lucas lamps, each equal to 700 candles; so that there would be a total of 135 ordinary lights and 6 Lucas lights. In the Outer Domain there are 45 ordinary lamps, each of 70-candle power; and the Company proposed to add 33 more—making a total of 78—and also to erect 2 Lucas lights. When the last advices reached us, no decision had been come to, probably owing to the fact that the Government contemplated placing the park under the control of the City Council.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

This year the annual accounts of the Edinburgh and Leith Gas Commissioners have been delayed in issue by about a month, the reason being that, the Commissioners having transacted all their available business before the middle of June, there was nothing else requiring them to be called together, and the statute allows till now for the presentation of the accounts. In the meantime, they have been audited and certified, and there will be this advantage arising from the delay—that they come forward as a final document, and can be approved at the first calling, instead of, as before, having to lie on the table for the Auditor's report. The document (see p. 187) is an entirely satisfactory one, whether as regards the consumption of gas or the financial results. As to the output of gas, it is found that the coal used was 164,976 tons, against 166,014 tons in the previous year, but, in addition, 3835 tons of oil was carburetted, as compared with 3419 tons. When rendered into their equivalent of coal, these amount to 24,319 and 22,043 tons respectively. So that the quantity of coal carbonized last year may be stated at 189,295 tons, against 188,057 tons, an increase of 1238 tons. From this quantity of raw material the gas made was 1,913,649,000 cubic feet, which was 57,942,000 cubic feet less than in the previous year. The yield of gas was at the rate of 10,108 cubic feet per ton, a decrease of 376 cubic feet. In passing, it may be noted that the average cost of coal was 13s. 1·96d. per ton, a decrease of 1s. 1d. The gas sold to the public amounted to 1,779,370,300 cubic feet, an increase of 21,329,100 cubic feet; and there were used on the works 23,693,700 cubic feet, an increase of 8,458,200 cubic feet. Thus, the total quantity of gas accounted for amounted to 1,803,064,000 cubic feet, an increase of 29,787,300 cubic feet. Gas unaccounted for was 110,585,000 cubic feet, a decrease of 87,729,300 cubic feet, which, it will be observed, is equal to the sum of the lessened make and the increased consumption. This extraordinary increase of consumption, upon a less output, however it is to be accounted for, is one of the most satisfactory features of the year's working. The percentage of unaccounted-for gas was reduced from 10·06 to 5·78, or nearly by one-half, which certainly testifies to increased care in the handling of the distributing plant. The average illuminating power of the gas was 24·18 candles, as compared with 24·62 candles. The price was 3s. 4d. per 1000 cubic feet from May to October, and 3s. thereafter.

The prominent features of the year's working are the very marked reduction in the unaccounted-for gas, and the substantial increase in the revenue from residual products. In a year in which there was so much transition as was involved in the closing of the Leith works and the opening of those at Granton, it was of necessity that some of the working results should not be quite so favourable as they might have been. Yet one may search the accounts through and through, and nothing will be found to indicate that circumstances were otherwise than most auspicious. With matters more consolidated, as they now are, and taking into account the better market conditions which have been obtained, it is not too much to look forward to the highly prosperous past year being superseded in the one now running.

The Town Council of Broughty Ferry seem to be impatient over the position in which they find their gas undertaking; for, instead of waiting for the report of Mr. W. R. Herring, whom they have consulted in the matter, they proceeded, on Monday night, to consider a report by the Emergency Committee they recently appointed. The Committee reported that they met immediately after their appointment, and arranged that the instructions given by Mr. Herring in his interim report should be carried out. The new retorts were stopped as quickly as possible, and the old ones put into working. This was completed in time to permit of a thorough inspection of the new retorts by Mr. Herring on his visit on Wednesday, the 8th curt., at which inspection he specially requested the builder of the retorts to be present. On Mr. Herring's recommendation, the Committee have approached Messrs. Dixon, Limited, with the object of endeavouring to cancel the contract running with them for the supply of 3000 tons of Wilsontown dross during the current year. As yet, they have been unsuccessful in attaining this object; and in so far as they can see, Messrs. Dixon will insist that the Council shall duly fulfil their part of the contract. The Committee have not approached the contractors for the supply of Dunnikier nuts, and have deferred dealing further with any of the contractors until the Council receive Mr. Herring's report. Meantime, the Committee thought it expedient to stop, so far as possible, the taking in of coal from any of the contractors, and thus reduce the stock in hand. As instructed by the Council, the stock at the gas-works on the 7th curt. was measured by Mr. Winning, and the details handed to Mr. Herring for comparison with the stock as at the end of the preceding month. The Committee recommend that a full report on the whole question of the condition, value, location, revenue, and generally everything connected with gas appliances for heating and cooking supplied by the Council be procured and submitted to the Town Council as early as possible. Meantime, pending the preparation of the report, it be an instruction to the Gas Manager and the Town Chamberlain that the capital value of any utensil hired out by the Council, on which interest is to be paid, shall not be less than 30s.—any utensil under that value to be treated on the "hire purchase" principle at the minimum charge of 1s. 6d. per annum. Mr. Herring has given certain instructions with reference to the building of the new retorts, all as per his report of July 9; and these instructions the Committee have taken immediate steps to have carried out. They suggested that, during their subsistence, they report monthly to the Council through the Provost's Committee. Provost Gray raised the question of the contract with the Messrs. Dixon, whose practice, he said, they were told, was not to contract. But he was informed that there was a sale note; and the Provost complained that somebody had exceeded his powers in making such an arrangement.

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Mr. Christie, the Convener of the Standing Gas Committee, entered a complaint of the action of the Emergency Committee in regard to heating and cooking appliances, because they had practically rescinded a previous resolution of the Council. They should, he thought, be very careful as to what they did. It was to their interest to foster the consumption of gas. The cost of connections, and of the grillers themselves, was very small compared with the sale of gas. It was pointed out that the arrangement was a temporary one, till they got fuller information. The report was adopted by nine votes to two.

At the same meeting, the Council, in view of the deficit of £3247 in the the Gas Department for the past year, resolved to rescind the minute of the Council directing that one-third of the cost of the sulphate of ammonia plant should be debited to the revenue account for the year to the 15th of May, 1903, and to suspend for the same period the special sum debited annually to the revenue account for depreciation of gas-stoves. They also agreed to defer consideration of the annual accounts till the Council meeting in August. The Town Council met last night in special session to receive Mr. Herring's report. The document was read by the Town Clerk. Without coming to any decision on the subject, the Council ordered the report to be printed and circulated, and resolved to meet next week to consider it.

The report of Mr. A. Gillespie, of Glasgow, upon the valuation of the Arbroath Corporation Gas-Works, the conclusion of which I gave last week, was submitted to the Town Council on Monday. In it Mr. Gillespie stated that he had gone into the matter fully, had visited the gas-works, had examined the Manager's books and statements, and had looked into the details brought out in the balance-sheets for the past six years. The value of the gas-works as a going concern he put down at £47,000. With reference to the cost, taking the abstract accounts for the year ending the 15th of May last, he finds the capital sum set down as the value of the Arbroath Gaslight Company's undertaking to be £20,000, and that there is an annual charge on revenue account of £1400 for payment of annuities, representing 7 per cent. on the capital of £20,000. In his opinion, the capitalized value of the annuities should be £46,667, assuming the rate of interest to be 3 per cent. By the Council's Act of 1871, power to borrow to the extent of £20,000 was granted for purposes specified in the Act; and up to the beginning of the year 1902, the actual sums borrowed amounted to £19,650. Against these capital charges, the only sums provided to be set aside were under the head of sinking fund; but the sums so provided are quite inadequate, and out of proportion, to the actual capital charges. Had the Council purchased the undertaking outright, and borrowed the money, they would, under the Burghs Gas Act for Scotland, have had to set apart yearly a sum equal to not less than a fortieth part of the borrowed money; and they would see that their position now would have been quite different had they been laying aside a sum approaching this proportion. By the first Act of 1871, no provision was made for a depreciation fund; and the want of such a fund made the position worse, as additional capital had to be raised for extensions and renewals, when these became necessary, though he finds that certain items are charged to revenue—such as new purifiers, new engine and boiler, and retort-house roof. By doing so, the capital charges have been kept down; but it would have been much better if the Council had been able to set aside a proportion yearly for a depreciation fund, out of which they could pay for such items as, for instance, the new exhausters and washer, or the new retort-house roof now rendered necessary. Under the new Act of 1899, the sinking fund was put on a better footing so far as regards money borrowed under the new Act; and provision has now been made in it for a contingency and depreciation fund. On consideration of the whole question, he is of opinion that the original cost, taking it to be £47,000, was too great a price for the undertaking; and as up to the time of the new Gas Act of 1899 adequate provision had not been made to provide a proportionate sum for the redemption of the annuities, and no fund existed for meeting renewals and depreciation, the capital account has thereby become too large. To bring down the capital to proper limits, and in order to make up for the years prior to 1899, when proper allowance was not taken from revenue, they will require to charge a greater sum now, and for some years to come, to the depreciation of works and contingency fund than in ordinary circumstances would have been necessary. Though, by the terms of the new Act, the sums to be set aside for sinking fund are fixed, still they are not sufficient or in proportion to the whole capital amount. He therefore advises that meantime an annual sum of not less than £1500 be set aside to cover depreciation and sinking funds. As to the proportion of cost to be charged against capital and revenue respectively, in the case of replacing existing plant by new plant, this can only be decided in particular cases according to the nature of the work done. In the Council's position, he should advise them that as they have the power by their Act to lay aside a sum for depreciation, they should take advantage of it, and pay as much as possible from the fund for outlays on works and pipes, without adding to capital. In the course of a conversation which took place upon the report, the Clerk stated that at the time when the undertaking was acquired, the value of an annuity was nothing like 30 years' purchase—it was only 22½ years. Therefore, if they had bought out the annuitants, they would have got the concern at 22½ years' purchase. The actual price, therefore, was £31,500. They could not say that money was of the same value now as it was in 1871. Mr. Robbie replied that they had never had an opportunity of purchasing the annuities, as they had never been on the market. They would still, he believed, be able to reduce the price of gas by 10d. per 1000 cubic feet. The report was adopted.

The fourth ordinary general meeting of the shareholders of the Saltcoats Gas Company, Limited, was held on Tuesday. The Directors' report, submitted by the Secretary (Mr. J. Campbell), stated that the balance at the credit of profit and loss account, after providing for depreciation on works, amounted to £1076. A dividend at the rate of 6¼ per cent., absorbing £1000, was declared; and the balance of £76 was carried forward. The revenue from the sale of gas and residuals

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is increasing steadily. During the year, the retort-house roof has been re-sheeted, and new mains laid in five thoroughfares. The premises and plant are in good order. Nearly all the old mains have now been renewed. The consumption of gas was 22,547,000 cubic feet; and the leakage has been reduced to 5·36 per cent.—the low percentage being due, no doubt, to the relaying of the mains. The gas made per ton of coal (2286 tons) was 10,421 cubic feet. The cost of coal was £1458, or an average price of 13s. 1d. per ton. The revenue from gas was £3697; from tar and liquor, £335; and from coke, £360. A year ago the dividend was at the rate of 5 per cent. It is exceedingly satisfactory to see this reconstructed Company flourishing under the enlightened management of Mr. J. Napier Myers.

The Perth Town Council on Monday discussed *ad longam* proposals by the Gas Committee to increase the salary of Mr. W. B. M'Lusky, the Gas Engineer and Manager, by £50, making it £350, and of Mr. Lindsay, the Gas Treasurer, by £15, making it £215. Mr. Cuthbert, the Convener, moved the increases separately. Speaking to that of Mr. M'Lusky, he compared the salaries paid by them with that paid to gas managers in other towns, bringing out that the salary in Perth was below that which was paid in towns of less size. The gas revenue, he pointed out, had doubled, and the responsibility had also doubled since Mr. Whimster was Manager. The proposal was opposed by Mr. Macpherson, who commented on the fact that Mr. Whimster receives £150 a year for services as Consulting Engineer, and recalled that the Convener had not told them how long the managers had been in office in the towns which had been enumerated. But the chief ground of his opposition was that at present a Committee are holding an inquiry into the mode of keeping the books at the gas-works; and he thought the Council should wait till the report was received before they voted an increase to any of the officials. He moved that the proposal be delayed till the report should be received. Mr. Chalmers seconded, and made a speech in which he introduced epithets regarding Mr. M'Lusky which I am quite certain are not warranted, and which I will exercise the discretion of not reproducing, because it would do no good, and besides, while Mr. Chalmers, on being asked to withdraw them, expressed his readiness to repeat what he had said, I cannot but think that, on reflection, he will desire that his remarks should be forgotten. The increase was agreed to by twelve votes to six. Then the increase to Mr. Lindsay was moved. There the strange thing happened that Mr. Chalmers, who was opposed to Mr. M'Lusky getting any increase at the present time, moved that Mr. Lindsay get, not £15, but £50, added to his salary. To give less he considered would be a direct insult to Mr. Lindsay. In the end, a motion that the increase be £25 was carried by a large majority.

The Corporation of Kirkintilloch have reduced the price of gas from 3s. 2d. to 2s. 8d. per 1000 cubic feet, and to 2s. 6d. for users of gas-engines. Two years ago, the price was 3s. 7d. per 1000 cubic feet. The amount of gas made last year was 42 million cubic feet. During the year, about £1500 has been spent upon improvements and extensions at the gas-works. The salary of the Manager (Mr. W. Wilson) has been advanced to £200.

The Corporation of Paisley this week reduced the price of gas from 2s. 9d. to 2s. 8d. to ordinary consumers, and from 2s. 7d. to 2s. 6d. for public lighting, but made no change in the price of gas consumed through prepayment meters. The Gas Committee, at a meeting of the Corporation this week, reported that they had considered a statement by Mr. G. R. Hislop, the Engineer and Manager, which showed that to abolish meter-rents would entail an annual loss of revenue of £1659, or equal to 1·08d. per 1000 cubic feet of gas sold. The Committee recommended that the rents be discontinued, and that consumers who own meters should be allowed a percentage on the value of them, corresponding to the period that they have been in use, up to ten years; meters which have been in use for more than ten years to be taken over and maintained by the Corporation free of charge. According to Mr. Hislop, the amount payable as compensation to proprietors of meters will be £1256. The Corporation approved of the proposal, and also agreed to make a reduction in the hire of gas-stoves.

At the annual meeting of the Markinch Gas Company, it was reported that during the past year unaccounted-for gas has been reduced by 4 per cent., and that sales of gas have increased by 5 per cent. A dividend at the rate of 5 per cent. was declared, and the price of gas was reduced from 5s. to 4s. 7d. per 1000 cubic feet. The Beith Gaslight Company have paid a dividend at the rate of 5 per cent.—an increase of 1 per cent. over the previous year. The Berwick and Tweedmouth Gas Company had a revenue last year of £6938, and an expenditure of £5758; leaving a net profit of £1179. A dividend of 10 per cent. has been declared. At the meeting of the shareholders this week, the Chairman intimated that the Directors had decided to allow a reduction in the price of gas to large consumers for cooking purposes and motive power, and that they were considering the introduction of gas-stoves for hire.

The annual general meeting of the Montrose Gaslight Company was held on Wednesday. The balance-sheet showed that the total income had been £6023, and the expenditure £4999; leaving a surplus of £1034. During the year, a large number of consumers had gone in for prepayment meters, and also for gas-cookers. Prepayment meters numbered about twice as many as at this time last year; and gas-cookers had risen from 19 to 60. The Directors recommended that a dividend at the rate of 35s. per share be paid, as compared with 30s. a year ago. Last year the price of gas was reduced by 3d. per 1000 cubic feet; and though they had not completed all their coal contracts for the current year, they were in hope that they would be able to reduce the price by another 3d. The report was adopted. The Vacancies on the Board were filled up, and the formality was gone through of re-electing Mr. T. D. Hall, the Manager of the Company.

The annual meeting of the Dalkeith Gaslight Company was held on Tuesday. A dividend at the rate of 10 per cent. was declared, and the balance of profit (£315) was applied towards reconstruction of the works. The price of gas was reduced from 4s. to 3s. 9d. per 1000 feet.

Bulks largely in the public eye.

EUREKA EUREKA

The Peterhead Town Council had the annual accounts of the Gas Department before them on Monday. Mr. Ritchie, the Convener, said that during the year they sold 30½ million cubic feet of gas, which was about 2 millions more than in the preceding year, and about 11 millions, or over 50 per cent., more than in 1898, when the present Manager was appointed. The leakage was about 10 per cent. From the sale of gas they had derived £4934, which was an increase of £347; and from the sale of residuals £1175, or £395 increase. Their total revenue was £6140, and the total expenditure £4790; leaving a balance of £1350, which was an increase of £521. Coal cost £3010, or £185 more; there having been 250 tons more, or 3400 tons altogether, carbonized during the year. The maintenance of works had cost £517, included in which were items that might have been very properly put to capital account. The sinking fund charges amounted to £651, and interest to £646. The balance carried forward was £1989, as compared with £1942 a year ago. Last year they had an additional item of revenue of £80 as the rent of gas-stoves. A very gratifying feature was the handsome returns now received for residuals. The return from sulphate of ammonia, tar, and naphtha was now equal to 3s. per ton of coal carbonized, as compared with 9½d. per ton when they sold the liquor—a saving being thereby effected of £380 in the past year. This was certainly a very handsome return in one year from an original outlay of £700 or £800 which the purchase and erection of chemical plant cost them. Coke gave them a return equal to 3s. 10d. per ton of coal carbonized, making a total for residuals of 6s. 10d. per ton of coal, which he believed was not exceeded in any gas-works in Scotland which were situated as they were in relation to freights of all materials used. Provost Leask said the credit for the good results obtained was due entirely to Mr. Keillor, the Gas Manager, along with the able assistance he got from Mr. Ritchie and his Committee.

The Kirkcaldy Gaslight Company, Limited, held their annual meeting yesterday. It was reported that the consumption of gas during the year ending May 31 was 139,265,000 cubic feet, which was an increase of over 7 millions during the year. The profit for the year was £4386. A dividend at the rate of 7s. 6d. per share was declared, to pay which required £3675. The balance of £711 was disposed of by adding £360 to the depreciation fund, and the balance to the reserve. The Directors referred with regret to the death of Mr. Ness, the Chairman, who had been long associated with the Company, and they also expressed their regret that Mr. A. MacPherson the Manager of the Company, had been obliged, upon medical advice, to place his resignation in their hands. Mr. MacPherson had been Manager of the Company for the long period of thirty-four years; and looking to the length of service, and the great growth and prosperity of the Company under his management, the Directors had granted him a retiring allowance. The price of gas was reduced from 3s. 5½d. to 3s. 2½d. per 1000 feet.

The Corporation of Dunfermline on Monday had before them estimates prepared by Mr. Waddell, the Gas Engineer and Manager, with the advice of the Convener of the Gas Committee (Bailie Harley), for the current year. These showed that, after reducing the price of gas from 3s. to 2s. 9d. per 1000 cubic feet to ordinary consumers and for public lighting, from 3s. 6d. to 3s. 4d. to users of prepayment meters, and from 3s. to 2s. 9d. for cooking and heating and continuing the price at 2s. 6d. for use in gas-engines, there would be an estimated surplus of £1262. They also agreed that the hire of gas-stoves should continue to be 5 per cent. on list prices. Having regard to the satisfactory manner in which Mr. Waddell had discharged his duties, and the economies he had effected in working expenses, the Committee agreed to recommend that his salary be increased by £50 a year—raising it to the amount which Mr. Pooley, his predecessor, had. Bailie Harley said it was in consequence of the satisfactory working of the machinery that had been introduced during the year that they were in the happy position of being able to reduce the price of gas. As a matter of fact, they were paying higher for their coal this year than last; but fortunately they were getting 1s. 9d. per ton more for their surplus coke. There was a considerable rise in the price of tar; and there would be a saving of £700 this year on the labour bill, which would be due almost entirely to the improved machinery. The recommendations of the Committee were adopted unanimously.

At the Alloa Town Council on Monday, Provost Arrol said he was pleased to be able to intimate that the Gas Committee had agreed to recommend that the price of gas be reduced to ordinary consumers by 2d. per 1000 cubic feet, and to users of gas-engines by 4d. per 1000 cubic feet, making the prices 2s. 2d. and 2s. respectively. These were very considerable reductions, especially when they considered that next year they would require to meet a deficit on the electric light undertaking almost double that of this year, owing to their having to pay for the first time interest on the sinking fund. Bailie Calder thought they might say of their gas undertaking that it was in the forefront.

The Stirling Gaslight Company held their annual meeting on Tuesday. The Chairman said they had secured 189 additional consumers during the year. The Directors were gratified to be able, for the first time, to recommend payment of the full standard dividends authorized by the Company's Act. Since 1896, the make of gas had increased from 62 to 99 million cubic feet per annum; and last year had been the most prosperous in the history of the Company. During the year, 100 gas-stoves and 136 grillers had been sent out; and since the close of the financial year, orders had been received for 47 stoves and 84 grillers. Prepayment meters were also in great demand, 242 of these having been fixed during the year, and orders were in hand for other 110. The amount taken from these meters was £1251. Dividend was declared absorbing £3200 of the profit, and £500 was placed to the credit of an insurance fund. The dividend is at the rate of 10 per cent. upon £24,000, and 5 per cent. upon £16,000.

The Hamilton Town Council on Tuesday had several items relating to the Corporation Gas Department before them. The balance-sheet for the past year showed that a net profit had been earned of £2013. The Committee thanked the Manager—Mr. J. Ballantyne—for his successful year's working, and for the good financial results; and they recommended that the price of gas be reduced 5d. per 1000 cubic feet

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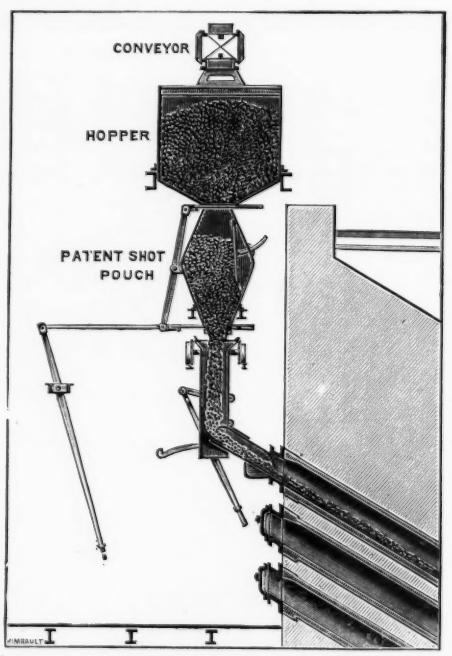

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making it 2s. 1d. It was reported that the profit on the working of the new sulphate plant for ten months had been £1418, and that the yield of sulphate per ton of coal was 32¾ lbs., which was above the average. Bailie MacHale expressed satisfaction with this result. Their income in 1895-96 was £11,108; and last year it was £22,322. This was a satisfactory rate of progress; and although the consumption of gas last year did not come up to the estimate, it was still large, having been 177,180,000 cubic feet—an increase of 180,957 cubic feet over the previous year. The Gas Committee recommended that the price of gas to users of prepayment meters be 2s. 11d. per 1000 cubic feet, and that the Council should put in gas-fittings free of charge. The recommendations were agreed to. It may be mentioned that the reduction in price restores Hamilton to the position of having the cheapest gas in Scotland.

The Corporation of Dumfries last week fixed their coal contracts for the Gas Department for the current year. The recommendation of the Manager—Mr. G. Malam—and adopted by the Gas Committee, was that no oil be purchased, but that, instead, they buy 750 tons of first-class cannel. The total cost is £6618; and the average price 15s. 2·75d. per ton, which is 11½d. per ton less than last year.

It was reported to the Kilmarnock Town Council last week that the profit on the year's operations in the Gas Department amounted to £2429.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 18.

Sulphate of Ammonia.

A quiet market has again to be recorded, and a still drooping tendency, the closing quotations being £12 10s. per ton f.o.b. Hull, and £12 12s. 6d. to £12 13s. 9d. f.o.b. Liverpool and Leith. Consumers are being encouraged to hold off by quotations at a discount in the forward position, while speculators continue to postpone their further purchasing as long as possible. Notwithstanding this, the decline in values has been very gradual, the larger makes having for the most part been sold in advance, and the smaller makes only having to be dealt with. For near months, London, Beckton terms, has been done at £12 12s. 6d. per ton, and that is the closing quotation. For July-December, and for October-March delivery, £12 10s. per ton, ordinary terms, is being quoted f.o.b., but this is quite 2s. 6d. per ton above the equivalent of prices current abroad, and still buyers remain indifferent.

Nitrate of Soda.

This is firm in all positions, and spot prices have been advanced to 9s. 7½d. per cwt. for ordinary and 9s. 9d. per cwt. for refined quality. Pending the decision of the Producers Committee as to maximum shipments, the forward market was very quiet, but a considerable business has since been done without dropping prices, and at the close there is a disposition to hold for more money.

LONDON, *July* 18.

Tar Products.

Business in tar products has been very restricted; and there is not much demand for either prompt or forward delivery. Pitch is decidedly quiet; and prices are slightly easier all round, doubtless owing to the absence of inquiry for either prompt or forward delivery. The South Wales consumers appear to be fairly well supplied for the present; and it is not usual to find the foreign contractors buying at this period of the year. There appears to be a better demand for special qualities of benzol for gas enriching, which should slightly improve the market; but unfortunately there is an absence of demand for export. For toluol, the market remains unchanged. There does not seem to be any demand; and the same remark applies to solvent naphtha. With regard to crude carbolic, business is still being done in 60's at 1s. 6d. for prompt and forward; but crystals remain very depressed. There is no business to report in anthracene. Consumers would be open to consider business for next year; but makers decline to offer except at a considerable improvement upon existing values. Several contracts have been placed for prompt and forward delivery of creosote, but at slightly below ordinary prices; and there is evidently a considerable quantity offering in the North of England. Tar prices still continue to rule very high, and much over the actual value of the article, even taking into consideration the present high price of pitch; and it is difficult to see how any tar distiller can make a profit on the prices recently paid in the Lancashire district for raw material.

The average values during the week were: Tar, 23s. 6d. to 33s. Pitch, London, 55s. to 55s. 6d.; east coast, 53s. to 53s. 6d.; west coast, 51s. 6d. to 52s. Benzol, 90 per cent., 8¼d. to 8½d.; 50-90 per cent., 7d. Toluol, 6½d. to 6¾d. Crude naphtha, 2½d. to 3d.; solvent naphtha, 7d. to 8½d.; heavy naphtha, 9d. Creosote, London, 1¼d. to 1⅜d.; North, 1⅛d. to 1¼d. Heavy oils, 2d. to 2⅛d. Carbolic acid, 60 per cent., 1s. 6d. Refined naphthalene, £5 to £8 10s.; salts, 21s. 6d. to 23s. 6d. Anthracene, "A" quality, 1¾d. to 1⅞d.; "B" quality, 1d. nominal.

Sulphate of Ammonia.

The market is decidedly quiet; and there is not much business doing. The Beckton price is now £12 15s.; but there are sellers at £12 10s. on Beckton terms, while another large Gas Company placed some 300 tons at this figure, but on their own special terms of contract. In Leith, makers accepted £12 12s. 6d. for some quantity, and are still sellers at this price; but consumers do not appear anxious to purchase just at present. The Hull price is nominally £12 10s.; but buyers will not pay this—in fact, they seem rather indifferent as to business at this port. In Liverpool there is very little doing. Some quantity of discoloured is reported to have been sold at under £12 10s.; but transactions are very limited. The market closes with a decidedly quiet tone, and prices may be taken as rather easier all round.

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COAL TRADE REPORTS.

Lancashire Coal Trade.

The position generally throughout the coal trade of this district undergoes no material change; business moving on very slowly in all descriptions of fuel. Collieries are restricting the output as far as possible to present demand, except that in house-fire qualities stocks are being put down to meet the usual winter requirements. In the better qualities of round coal, suitable for house-fire purposes, there is just now extremely little doing. Some pits are not putting in more than about two days, with the general average scarcely more than three, apart from collieries that are exceptionally situated and able to run about four days per week. Quoted rates are unchanged; but there is here and there weakness in selling prices for immediate delivery. At the pit mouth, best Wigan Arley remains at about 14s and 14s. 6d. per ton, with seconds Arley and Pemberton four-feet quoted at 11s. and 11s. 6d. up to 12s. 6d., and the commoner sorts of house-fire coal from 9s. 6d. to 10s. 6d. There are plentiful supplies of all the lower qualities of round coal on the market. To effect immediate clearances of surplus lots, some very low prices are being taken; collieries in some instances being prepared to practically entertain offers from buyers. Common round coals are obtainable for inland sale at from about 7s. 6d. and 7s. 9d. up to 8s. 3d. at the pit, with some of the better qualities quoted 8s. 6d. to 8s. 9d. Collieries, however, are not prepared to contract forward at the minimum prices above quoted; but there is comparatively little doing on the part of buyers beyond covering current requirements at the low prices just now ruling on the market. One or two further important contracts for gas coal have been settled during the past week at 6d. under last year. The general basis prices remain at about 8s. 3d. to 8s. 9d. per ton for common screened Wigan four-feet, to about 9s. for the better qualities and 9s. 3d. to 9s. 9d. for ordinary screened Wigan Arley, with some of the better sorts averaging 9s. 9d. to 10s. Engine fuel continues fairly plentiful, especially in the commoner sorts. Notwithstanding the present restricted production of slack, the better qualities of engine fuel remain steady at about 6s. 3d. up to 6s. 9d. and 7s. per ton for special sorts, with inferior qualities quoted low at about 3s. 9d. to 4s. 3d. up to 4s. 6d. In the shipping trade, low quotations continue to be made to effect clearances. Common steam coals can be bought at 8s. 9d. to 9s. per ton, with ordinary quotations 9s. 6d. to 9s. 9d. at the ports on the Mersey.

Northern Coal Trade.

There is a steady demand for coal, especially for export; but as there are generally ample supplies, prices do not show any very material difference. Best Northumbrian steam coals are steady at 10s. 7½d. per ton f.o.b. Second-class steams seem in fuller supply; and the price varies from 8s. 9d. to 9s. 3d. Steam smalls are from 5s. 3d. to 5s. 6d. per ton, and plentiful. In the gas coal trade, there is still a full export; and there is a slight increase in the home demand, which will show itself more fully in the next month or so. Prices of Durham gas coals vary from 8s. 6d. to 9s. per ton f.o.b., for occasional supplies; while one or two relatively small contracts have been fixed at prices that, after allowing for the freight, leave from 8s. 3d. to 8s. 9d. per ton, according to quality. Gas coke is still in limited supply, the price varying from 12s. 6d. to 13s. 3d. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

It cannot be said that an improvement in trade has yet set in. The home demand is still the most active; and, for all that can be seen, is likely to remain so. Prices do not show much variation. The quotations are: Main 7s. 9d. to 8s. per ton f.o.b. Glasgow, ell 8s. 3d. to 9s. 6d., and splint 9s. to 9s. 3d. The shipments for the week amounted to 222,547 tons, a decrease of 23,259 tons upon the previous week, and of 15,078 tons upon the corresponding week of last year. For the year to date, the total shipments have been 5,577,085 tons, an increase of 188,181 tons upon the same period of last year.

London County Council and the Crystal Palace District Gas Bill.—At the meeting of the London County Council on the 14th inst., the report of the Parliamentary Committee on their proceedings in regard to the above-named Bill, noticed in the "JOURNAL" last week (p. 121), was presented; and the action taken by the Committee in the matter was formally approved.

Tiverton Corporation Gas-Works.—Reports presented to the Tiverton Town Council yesterday week showed that the results of the past year's working of the gas undertaking had been in some respects unsatisfactory. The Auditors said they found the net profit was less by £663 than in the year preceding, and not sufficient by £401 to meet the standing charges. Of the deficiency, £184 was due to a reduction of 2d. per 1000 cubic feet in the price charged for gas; but there was a decrease in the quantity of gas sold, an increase in the amount of coal used, and the percentage of loss was almost double. Mr. Thorne, in moving the adoption of the report and that of the Borough Accountant, said he was both disappointed and dissatisfied. It was true that there had been a reduction in the price of gas; but against this must be set a reduction of 1s. per ton in the price of coal. As to the increase in the percentage of unaccounted-for gas, he thought steps should have been taken to check the loss. In order to provide for depreciation and the interest and sinking fund charges, £401 would have to be taken from the reserve fund. In reply to a question, the Manager said the reports of leakage were always attended to as soon as possible. Several members expressed disappointment at the result of the year's working, and suggestions were made that there should be more frequent accounts, and for the Committee to exercise closer supervision. Mr. Thorne stated that in the first year the net profit was £1366. The reports were adopted.

CARBURETTED WATER-GAS APPARATUS

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	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	ACCRINGTON	500,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	TONBRIDGE	300,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	STRETFORD	500,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	OLDBURY	300,000
BIRKENHEAD	2,250,000	ST. CATHERINES (Second Contract)	250,000	TODMORDEN	500,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	YORK (Second Contract)	750,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	ROCHESTER (Second Contract)	500,000
HALIFAX	1,000,000	YORK	750,000	NEWPORT (MON.)	250,000
TORONTO	250,000	ROCHESTER	500,000	TOKIO, JAPAN	1,000,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	PERNAMBUCO (Brazil)	125,000
LINDSAY (Remodelled)	25,000	CRYSTAL PALACE DISTRICT	2,000,000	MALTON	150,000
MONTREAL	500,000	DULUTH, MINN.	300,000	DULUTH, MINN. (Second Contract)	300,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	BROCKVILLE (ONT.)	250,000
BELLEVILLE	250,000	LEICESTER	2,000,000	SMETHWICK	500,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	GRAVESEND	300,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	NEWPORT MON. (Second Contract)	250,000
		BURNLEY	1,500,000	TORONTO (Third Contract)	750,000
		KINGSTON-ON-THAMES	1,750,000	TORONTO (Fourth Contract)	1,000,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.
MONTREAL, ONT. (Second Contract) . . . . . 1,800,000 Cub. Ft.

Chalk Power-Gas Syndicate, Limited.—This Syndicate was registered a few days ago with a capital of £25,000, in £1 shares, to acquire the benefit of certain inventions for the manufacture of power and other gas from chalk, limestone, and other carbonates; to adopt an agreement with R. Pearson; and to carry on the business of gas manufacturers, cement and lime manufacturers, engineers, founders, &c. There will be no initial public issue.

New Water-Works for Harrogate.—Last Wednesday, a formal start was made with the new water-works which the Harrogate Corporation are about to construct at Roundhills, near Masham, by the cutting of the first turf by Alderman Fortune, the Chairman of the Water Committee, in the presence of a large gathering. In the opinion of the Water Engineer to the Corporation (Mr. E. W. Dixon, M.Inst C.E.), the work will take seven years to complete, and will cost about £325,000. From a reservoir a mile in length, the water will be conveyed 18 miles to Harrogate, nearly a quarter of the distance being by tunnelling, in pipes. The top water-level being nearly 300 feet above that of the town, or 743 feet above Ordnance datum, there will be no difficulty in conveying the water by gravitation. The capacity of the reservoir is 540 million gallons—the water area being 60 acres; and when complete, it will provide Harrogate with 2½ million gallons a day.

Reductions in Price.—The Stalybridge Town Council have decided to reduce the price of gas from 2s. 8d. to 2s. 7d. per 1000 cubic feet, with a discount of 3d. per 1000 cubic feet for prompt payment. It is understood that the Birmingham Gas Committee have agreed to present a report to the City Council in which they will recommend a reduction in the charges for gas. The rate to small consumers is proposed to be reduced from 2s. 9d. to 2s. 6d. per 1000 cubic feet; thus remitting the extra 3d. which was imposed two years ago to meet the greater cost of coal. The other rates will at the same time be reduced; and it is stated that among the concessions in price to be allowed is one to those who have adopted the prepayment meter system, who will also be granted the free use of small gas stoves or grillers. The Bo'ness Gas Company have agreed to reduce the price of gas from 3s. 9d. to 3s. 4d. per 1000 cubic feet. The reduction is not to take effect till after the October survey of meters. The Lichfield Gas Company have reduced the price of gas to 3s. 2d. per 1000 cubic feet for the current half year. On this figure a tender was recently submitted for the public lighting for the period from August next to April, 1904, and was adopted. The Kirkintilloch Town Council have decided to reduce the price of gas from 3s. 2d. to 2s. 8d. per 1000 cubic feet to ordinary consumers, and to 2s. 6d. to users of gas-engines. At Paisley, the price of gas is to be reduced from 2s. 9d. to 2s. 8d. per 1000 cubic feet, with a further reduction of 6d. per 1000 feet to users for motive-power purposes. The Gas Committee at Batley have decided to recommend a reduction of 2d. per 1000 cubic feet in the price of gas within the borough. The Directors of the Dalkeith Gas Company have lowered the charge for gas from 4s. to 3s. 9d. per 1000 cubic feet.

Sales of Stocks and Shares.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards sold, by order of the Directors, a new issue of 4 per cent. perpetual debenture stock of the South Essex Water-Works Company, at £110 per £100. On the same occasion, some "C" stock of the Barnet District Gas and Water Company (last dividend £7 10s. per cent.) fetched £165 and £167 per £100; some "D" capital gas stock (last dividend £5 5s. per cent.), at £106 per £100; and some of this class of water stock, at £110 10s. The next day, Mr. E. L. Gardener sold £66 of consolidated "A" stock and £340 of "B" stock of the Canterbury Gas and Water Company at £18 10s. per £10 parcel.

A Water Deal between Halifax and Morley.—The Halifax Town Council have just sanctioned an important agreement with Morley to supply them with water in augmentation of their own supply. Since 1896, Morley has been paying Halifax a royalty of 1d. per 1000 gallons on water they have themselves been selling to East and West Ardsley; those places being in the Halifax area of supply. This royalty has brought in Halifax, for the past six years, an average of about £250 per annum. Morley now propose to arrange with them, on the completion of the Walshaw Dean reservoirs, for a minimum supply of 25 million gallons per annum, with liberty to take a maximum of 75 millions, at 5d. per 1000 gallons. The royalty referred to on these terms being accepted is to be reduced to ½d. per 1000 gallons, and all water sold by Morley in East and West Ardsley over 75 million gallons is to be free. The agreement is for fifteen years, with two years' notice of future abandonment or variation.

East Surrey Water Company.—At the recent annual general meeting of this Company, the Directors reported that 769 customers had been added in the year ending March 25, and that the profit realized on the working had been £21,996. With the balance of £1698 brought forward, there was produced a sum of £23,694, out of which the Directors had placed £900 to the renewal and contingency fund; and they recommended that the dividend of 5 per cent. upon the preference shares, a dividend of 10 per cent. upon the original ordinary shares, and of 7 per cent. upon the ordinary shares (less income-tax in all cases) should be declared for the year. An interim dividend of 2½ per cent. upon the preference, and 5 and 3½ per cent. upon the two classes of ordinary shares respectively having been paid, there would remain 2½ per cent. to be paid upon the preference and 5 and 3½ per cent upon the ordinary shares, leaving a balance of £1797 to be carried forward. The Chairman (Sir Frederick Bramwell, Bart.), in moving the adoption of the report, remarked that the Company had done their duty to the district during the year by laying 22½ miles of mains; making the total length 373 miles, which he considered an enormous mileage in comparison with the quantity of water distributed. The report was adopted. Power was given to the Directors to grant retiring allowances to old servants; and the thanks of the meeting were accorded to the Engineer, Manager, and Secretary (Mr. J. Rathbone Downes), as well as to his Assistant (Mr. A. E. Cornewall-Walker) and the staff, for their services to the Company.

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Over 80 (4 in. to 36 in. inclusive) in use.

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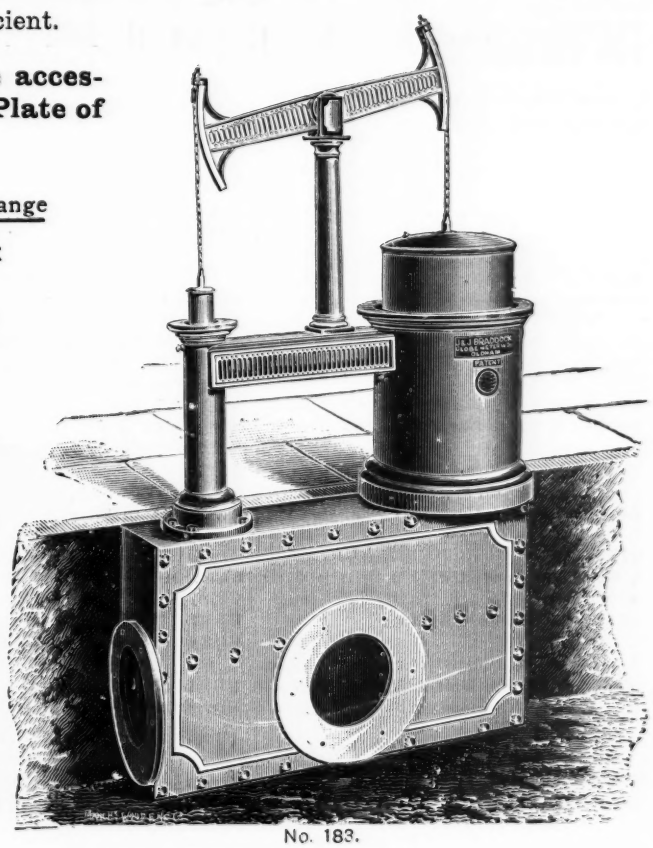
The Inlet and Outlet may be as Illustrated, or at opposite ends (or sides) of the Valve-Chamber.



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Proposed Joint Water Scheme for Hyde and Glossop.—The members of the Hyde Town Council have resolved to visit Shelf Valley, near Glossop, for the purpose of considering the advisability of the Hyde and Glossop Corporations joining in a scheme for obtaining a supply of water from the neighbourhood. Mr. Kenny, the Chairman of the Water Committee, stated that the proposal would not necessitate the construction of reservoirs, but merely of dams. The cost of the work, including the ground, &c., was roughly estimated at £110,000, one-third of which it was anticipated would have to be provided by Hyde. In addition to this, however, it would cost them £20,000 to convey the water to the town.

Bulawayo Water and Electric Light Company, Limited.—The seventh ordinary general meeting of this Company was held on Monday last week, at the Cannon Street Hotel—Lieut.-Col. A. Weston Jarvis in the chair. In moving the adoption of the report, he stated that the sales of water in the year 1901 amounted to 4½ million gallons, while last year the quantity sold was 8 million gallons; and the number of consumers rose from 85 to 150. The costs decreased by 23 per cent., and the revenue from water increased by 43 per cent. last year compared with the figures for 1901. There were now 16 miles of mains laid through the town and suburbs, and they were recently asked to lay three miles more. The profits had been gradually increasing year by year—from £406 in 1898 to £7684 last year, and exclusive of depreciation and interest on loans. The Board had decided to set aside £4000 a year for depreciation. All the profits which had been derived from the water-works and the electric lighting had hitherto been put into increased plant. It was, therefore, now necessary to raise further money; and it was proposed by the Board to shortly make an issue of £60,000 of debentures. The report was adopted; and the proceedings closed with the usual votes of thanks to the Board and officials

Leaky Reservoir at Teignmouth.—A report by Mr. Vincent Smith, the Surveyor, on the subject of the new reservoir at Hazeldown, was recently considered by the Teignmouth Urban District Council. The work was undertaken in 1898, the price of the accepted contract being £5918; but with extras the actual amount paid to the Contractor was £6915. The late Surveyor, under whose direction and control the contract was carried out, certified before the final payment that the reservoir was perfectly water tight, and that the work was done in a thorough manner. Last month, however, the reservoir was found to be freely leaking, and, on examination, the concrete proved to have serious defects, and was certified by experts to be of bad quality. Mr. Smith recommended a scheme of repair which he said practically meant the construction of a second reservoir inside the present one, slightly reducing the capacity. This inner reservoir would be lined with bitumen; and he estimated that the cost would be £1600. After considering the matter in private, the Council announced that they had decided to apply for authority for a loan of £1700 for putting the reservoir in a proper condition.

At last week's meeting of the Bradford City Council, the salary of the Gas Engineer, Mr. Charles Wood, was advanced from £600 to £800 per annum.

Messrs. R. & A. Main, Limited, have taken new offices in the City; and as from the 27th inst. their London address will be No. 49, Queen Victoria Street, E.C.

We are notified by Messrs. Thomas Glover and Co., Limited, that after this week their address will be No. 49, Queen Victoria Street, E.C., where they are removing from St. John Street, Clerkenwell.

We learn from the "Ironmonger" that the Gas Strip Association recently had a meeting in Birmingham under the presidency of Sir Benjamin Hingley, and resolved to reduce the basis by 2s. 6d. The previous standard was £6 12s. 6d. for large, and £6 15s. for small orders.

At the meeting of the Mansfield Town Council on Friday, it was decided, on the joint recommendation of the Gas and Water Committees, to increase the salary of the Engineer (Mr. A. Graham) by £50 per annum as from the 1st prox.—£30 in respect of the gas, and £20 of the water undertaking.

The Notkin Light and Power Company was registered in Edinburgh last week, to carry on the business of manufacturers and vendors of carburetting apparatus for lighting, heating, and other purposes at present carried on by them. The capital is £2500 in 1000 deferred and 1500 preferred shares of £1 each.

Messrs. Crossley Bros., of Manchester, are constructing a number of large-power gas-engines for the United States. The contracts include four engines, each averaging between 500 and 600 brake horse power, and two of about 350 brake horse power each, all of double-cylinder type with crank in the centre.

We learn that Messrs. Graham, Morton, and Co., Ltd., the well-known makers of conveying machinery and colliery plant, are building a large, complete new engineering works at Hunslet, Leeds. These works are designed upon the latest principles of modern methods of manufacturing their speciality work. The works comprise three large bays (50 feet span) over 400 feet long, together with engine and boiler house, &c., and other outside buildings. The machinery will be driven by electric motors; the current being generated on the works. There will be two electric cranes in each bay, or a total of six cranes. There is also a railway siding running into the works; and the trucks will be able to travel right through the workshop. Mr. Maurice Graham, the active partner in the concern, has lately made two long trips in the United States for the purpose of visiting the engineering shops there; and he has returned with most valuable information, not only in connection with the description of tools used, but also with regard to their method of organization. The work, therefore, has been designed by Mr. Graham upon these principles; and it will be interesting to our readers to inspect them when they are finished, which, it is understood, will be about the end of October.

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ASSISTANT-ENGINEER (Calcutta). Oriental Gas Company, London.
CARBONIZING FOREMAN. Wigan Gas Department.
CLERK OF WORKS. No. 4070.
GAS-FITTER AND IMPROVER. Barking Gas Company.
GENERAL FOREMAN. No. 4068.
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EXHAUSTER (15,000 feet per hour). Woolton Gas-Works.
METER (3000 cubic feet capacity). Marshall, Kaye, and Marshall, Ravensthorpe.
PURIFIERS, &c. Bathgate Gas Company.
STATION METER AND GOVERNOR. Chard Gas-Works.
STREET LANTERNS, &c. East Ham Corporation. July 27.

Plant (Second-Hand) Wanted.

CONDENSERS, &c. Cowdenbeath Gas-Works.
GASHOLDER. Milne House, Wakefield.
PURIFIERS (two). Coward and Co., London.
WASHER-SCRUBBER AND EXHAUSTER AND ENGINE. Irvine Gas-Works.

Meetings of Companies.

KENT WATER-WORKS COMPANY. Aug. 5.
SOUTH METROPOLITAN GAS COMPANY. Aug. 12.

Sale of Shares.

HORLEY GAS COMPANY. July 29.

TENDERS FOR

Building and Excavation.

COVENTRY GAS DEPARTMENT. Tenders by Aug. 1.

Boilers.

COVENTRY GAS DEPARTMENT. Tenders by Aug. 1.

Coal and Cannel.

BEVERLEY GAS DEPARTMENT. Tenders by July 29.

Engine and Exhauster.

IRVINE GAS-WORKS.

Gasholder, &c.

DEVONPORT GAS DEPARTMENT. Tenders by Aug. 29.

Ironwork (Wrought and Cast).

COVENTRY GAS DEPARTMENT. Tenders by Aug. 1.

Meters.

GLASGOW GAS DEPARTMENT. Tenders by Aug. 3.

Oil for Gas Making.

SMETHWICK GAS DEPARTMENT. Tenders by July 30.

Pipes and Pipe Laying.

CUDWORTH GAS DEPARTMENT. Tenders by Aug. 4.

Tar and Ammoniacal Liquor.

RADCLIFFE AND PILKINGTON GAS COMPANY. Tenders by Aug. 4.

Washer-Scrubber.

IRVINE GAS-WORKS.

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THE Services of a Carbonizing Foreman are required by the Gas Committee of the above.

Particulars may be obtained on writing to the undersigned.

State Age and Experience. References (not Testimonials) to accompany the application.

JOS. TIMMINS, M.Inst.C.E.,
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Wigan, July 10, 1903.

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THE Directors of this Company require a SUPERINTENDENT for their Grimesthorpe Gas and Chemical Works.

The present maximum make of Gas is 5 million cubic feet per day; Sulphate of Ammonia, about 3000 tons per annum; and Sulphuric Acid, about 2500 tons per annum.

Salary £300 per annum, with House, rent free.

Applications, marked "Superintendent," stating Age and previous Engagements, to be made by letter only, addressed to the undersigned, not later than Monday, Aug. 10, 1903.

Testimonials not to be sent till asked for.

HANBURY THOMAS,
General Manager and Secretary.

Gas Offices, Commercial Street, Sheffield, July 18, 1903.

WANTED, New or Second-hand, in Good Order, one WASHER-SCRUBBER, and one EXHAUSTER with ENGINE combined, each for 15,000 cubic feet per hour.

Particulars to the MANAGER, Gas-Works, IRVINE, N.B.

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Offers to be handed in to the undersigned not later than Monday, the 27th curt., at Ten o'clock.

A. H. CAMPBELL,
Engineer and Surveyor.

TO IRONFOUNDERS AND SMITHS.

THE Gas Committee of the Coventry Corporation invite TENDERS for the Manufacture, Construction, and Erection at their Foleshill Works of about 110 Tons of Cast and Wrought IRONWORK, comprised in Roofs, Columns, Girders, Elevated Water and Liquor Tanks, &c.

The Specification, with Form of Tender and Schedule of Quantities, together with prints of the Drawings, may be obtained from the undersigned on payment of One Guinea, which will not be returned.

The Committee do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, addressed to the Chairman of the Gas Committee, Gas-Works, Coventry, and endorsed "Tender for Ironwork for Sulphate Works and Liquor Tanks," must be delivered on or before Saturday, the 1st of August next.

FLETCHER W. STEVENSON,
Engineer and General Manager.

Gas-Works, Coventry,
July 13, 1903.

TO BOILERMAKERS.

THE Gas Committee of the Coventry Corporation invite TENDERS for the Manufacture and Delivery at their Foleshill Works of a Lancashire BOILER 30 ft. long by 7 ft. 6 in. diameter.

The Specification, with Form of Tender, may be obtained from the undersigned on payment of One Guinea, which will be returned on receipt of a *bonâ-fide* Tender.

The Committee do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, addressed to the Chairman of the Gas Committee, Gas-Works, Coventry, and endorsed "Tender for Lancashire Boiler," must be delivered on or before Saturday, the 1st of August next.

FLETCHER W. STEVENSON,
Engineer and General Manager.

Gas-Works, Coventry,
July 13, 1903.

TO BUILDERS AND CONTRACTORS.

THE Gas Committee of the Coventry Corporation invite TENDERS for the following BUILDERS' WORK to be executed at their Foleshill Works:—

SPECIFICATION No. 6.—Sulphate-Works, comprising Sulphate-House, 54 ft. 9 in. by 27 ft. 6 in.; Sulphate-Store, 54 ft. by 18 ft.; Boiler-House, 48 ft. 3 in. by 30 ft.; Lime Store and Warehouse over, 31 ft. 8 in. by 15 ft. 6 in.; and Chimney Shaft, 80 ft. high.

SPECIFICATION No. 7.—Excavation for, and Construction of, an Underground Liquor Tank, 50 ft. diameter by 15 ft.

Specifications, with Forms of Tender and Schedules of Quantities, may be obtained, and Drawings seen, on application to the undersigned on payment of One Guinea, which will be returned on receipt of *bonâ-fide* Tender.

Sealed Tenders, addressed to the Chairman of the Gas Committee, Gas-Works, Coventry, and endorsed respectively "Tender for Sulphate-Works Buildings" and "Tender for Underground Liquor Tank," to be delivered on or before Saturday, the 1st of August next.

FLETCHER W. STEVENSON,
Engineer and General Manager.

Gas-Works, Coventry,
July 13, 1903.

DEVONPORT GAS-WORKS.

CONTRACT No. 7.

TELESCOPIC GASHOLDER AND APPENDAGES.

THE Corporation of Devonport are pre- pared to receive TENDERS for the Construction and Erection of a TELESCOPIC GASHOLDER and APPENDAGES at their Works.

Copies of the Specification and the Drawings can be seen, on and after Wednesday, the 22nd day of July, 1903, at the Manager's Office, Gas-Works, Devonport, or at the Office of the Engineers, Messrs. Stevenson and Burstal, 38, Parliament Street, Westminster.

Copies of the Tender and Bill of Quantities can be obtained from the above-mentioned on payment of One Guinea, which will be returned upon receipt of a *bonâ-fide* Tender.

Should intending Contractors so desire, they can obtain copies of the Drawings upon payment of Two Guineas by applying to the Engineers.

The Corporation do not bind themselves to accept the lowest or any other Tender.

Sealed Tenders, endorsed in accordance with the instructions at the head of the Tender, to be delivered to the Deputy Town Clerk, Devonport, not later than Saturday, the 29th day of August, 1903.

SIDNEY E. STEVENSON,
Engineer and Manager.

Gas-Works, Devonport.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Cannon Street Hotel, in the City of London, on Wednesday, the 12th day of August next, at Two o'clock in the afternoon precisely, to receive the Directors' Report and the Accounts of the Company for the Half-Year ended the 30th of June last, and to declare a Dividend for the same period.

Notice is Hereby also Given, that at such Meeting the Directors will submit a resolution to the Proprietors for authority to raise £250,000 Further Capital, by the creation and Issue of Ordinary Stock and Debenture Stock Pursuant to the Powers contained in the Company's Acts, of 1895 and 1901. This Stock will be raised from time to time as required.

The TRANSFER BOOKS WILL BE CLOSED from the 29th day of July inst. until after the Meeting.

By order,
FRANK BUSH,
Secretary.

Offices: 709, Old Kent Road, S.E.,
July 18, 1903.

GLASGOW CORPORATION.

(GAS DEPARTMENT.)

THE Corporation invite Tenders for the supply of such METERS as may be required by them for Twelve Months from date of acceptance.

Forms of Tender may be obtained on application at the Gas Manager's Office, 45, John Street, Glasgow; and sealed Offers, marked "Tender for Gas-Meters," and addressed to the Subscriber, will be received by him on or before Monday, the 3rd of August.

The Corporation do not bind themselves to accept the lowest or any Offer.

J. D. MARWICK,
Town Clerk.

City Chambers, Glasgow,
July 11, 1903.

BOROUGH OF SMETHWICK.

GAS OIL.

THE Gas Committee are prepared to receive TENDERS for the supply of about 120,000 Gallons of OIL suitable for the manufacture of Carburetted Water Gas, delivered free at the Gas-Works, Rabone Lane, Smethwick, in such quantities and at such times as may be required by the Committee, during the period ending the 30th of June, 1904.

Analysis and full Description, with a sealed Sample of the Oil offered, must be sent with Tender, addressed to the undersigned, not later than the 30th of July inst.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
W. J. STURGES,
Secretary.

Gas Offices, Town Hall,
Smethwick, July 17, 1903.

BOROUGH OF BEVERLEY.

TENDERS FOR COAL.

THE Gas Committee are desirous to re- ceive TENDERS for the supply of not exceeding 7000 Tons of COAL, for use at the Gas-Works, Beverley, for a period of Twelve Months from the 1st of October next, to be delivered as from time to time directed, and at the expense of the Contractors, f.o.b. at Keadby, or at the Pits or at the Railway Station, Beverley, according to terms of Contract.

The Coal to be of the best kind, well-screened, free from Sulphur, Bats, Bind, Refuse, and Dirt, and to be weighed 21 cwt. to the Ton upon the Corporation Machine.

Payments will be made from time to time so long as the Contractors shall duly fulfil the Contract.

The Corporation do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to divide the Contract as they think fit.

Further Information and Forms of Tender may be obtained of the Gas Manager, Mr. F. W. Oldfield, at the Gas-Works, Beverley, and Tenders, endorsed "Tender for Coals," must be delivered at my Office not later than Wednesday, the 29th day of July, 1903.

J. WILLIS MILLS,
Town Clerk.

CUDWORTH URBAN DISTRICT COUNCIL.

GAS SUPPLY.

TO PIPE FOUNDERS AND MAINLAYING CONTRACTORS.

THE above Council invite Tenders for the following:—

CONTRACT No. 3.

For the Supply and Delivery of about 3½ miles of Cast-Iron Common Socket MAIN PIPES, including 8-inch, 6-inch, 4-inch, 3-inch, and 2-inch Pipes, with the necessary Tees, Bends, Junctions, Syphons, &c.

Delivered at the Midland Railway Station, Cudworth.

CONTRACT No. 4.

EXCAVATING for and LAYING the above, including the supply and fixing of the necessary Valves, &c.

Specifications and Drawings may be seen, and Quantities obtained, on and after Thursday, the 23rd day of July, on application to Mr. W. W. Hutchinson, Gas Engineer, Pontefract Road, Barnsley, on payment of the sum of 2 Guineas, which will be returned on receipt of a *bonâ-fide* Tender.

Sealed Tenders, endorsed "Tenders for Pipes" or "Tenders for Mainlaying," to be delivered to the undersigned not later than Twelve a.m. on Tuesday, Aug. 4, 1903.

The Council do not bind themselves to accept the lowest or any Tender, and persons tendering do so at their own expense.

W. E. RALEY,
Clerk to the said Council.

Regent Street, Barnsley,
July 16, 1903.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By Order of the Directors, at a Nominal Reserve.

HORLEY DISTRICT GAS COMPANY,

INCORPORATED BY SPECIAL ACT OF PARLIAMENT.

£4346 FIVE PER CENT. PREFERENCE STOCK.

MESSRS. EDWIN FOX & BOUSFIELD, will SELL BY AUCTION, at the Mart, London, on Wednesday, July 29, at Two o'clock, the above Stock, in Lots.

Particulars of Messrs. EDWIN FOX AND BOUSFIELD, 99, GRESHAM STREET, LONDON, E.C.

RADCLIFFE AND PILKINGTON GAS COMPANY.

TO TAR DISTILLERS.

THE Directors of this Company invite TENDERS for the purchase of 800 Tons of the surplus TAR to be produced at their Works in Radcliffe during the Twelve Months commencing the 1st of September next.

Particulars may be obtained from the undersigned, to whom Tenders must be delivered not later than Tuesday, the 4th of August.

JAMES BRADDOCK,
Manager and Secretary.

Gas-Works, Radcliffe,
July 17, 1903.

KENT WATER-WORKS.

NOTICE is Hereby Given, that a GENERAL MEETING of the Company of Proprietors of the Kent Water-Works will be held at the Terminus Hotel, Cannon Street, City of London, on Wednesday, the 5th day of August, 1903, at the hour of Twelve at noon, pursuant to the Act of Parliament—

To receive a Report from the Directors.

To declare a Dividend.

To transact generally the business of a General Meeting of the Company.

The Chair will be taken, and proceedings commence, at Twelve o'clock precisely.

The REGISTER OF TRANSFERS WILL BE CLOSED on the 23rd day of July, and until the 5th day of August, both days inclusive.

By order of the Directors,
A. DICKSON, Jun.,
Chief Clerk and Secretary.

Mill Lane, Deptford,
July 17, 1903.

EUROPEAN GAS COMPANY, LIMITED.

SHARE WARRANTS TO BEARER.

NOTICE is Hereby Given that, in ac- cordance with a Resolution passed at the Annual General Meeting of Shareholders held on the 14th instant, a DIVIDEND and BONUS of Thirteen Shillings per Share will be PAYABLE, on and after the 1st proximo, on the above Shares, subject, however, to a deduction of 1s. 1d. per Share for French Stamp and Transfer Duty.

Payment will be made to the Union of London and Smith's Bank, Limited, Princes Street, London, E.C., after Serial Coupon No. 57 has been left three clear days for Examination.

W. WILLIAMS,
Secretary and General Manager.

July 15, 1903.

NEWCASTLE AND GATESHEAD WATER COMPANY.

SALE OF ORDINARY STOCK.

TO BE SOLD by Auction, in the Board Room of the Company's Offices, Pilgrim Street, Newcastle-on-Tyne, on Tuesday, the 21st of July, 1903, at Half-past Twelve o'clock precisely, by Mr. CHARLES A. JOEL, in such Lots as are provided for in the Company's Act of 1898—

SIXTY THOUSAND POUNDS OF ORDINARY STOCK (ACT, 1898).
(MAXIMUM DIVIDEND £7 PER CENT. PER ANNUM.)

The above Stock is part of the £7 per cent. Maximum Ordinary Stock created under the powers of the Newcastle and Gateshead Water-Works Acts, 1898 and 1902.

The Dividend is subject to proportionate diminution whenever the Maximum Dividend to which each class of Ordinary Stock of the Company is entitled shall not be paid in full, but such diminution may be made up in subsequent Years. The Dividend paid on the Ordinary Stocks of the Company for the past four Years has been as follows:—

On the Original Ordinary £10 per cent. Stock, £8 10s. per cent. per annum.

On the Ordinary £7 per cent. Stock, £5 19s. per cent. per annum.

Printed Particulars and Conditions of Sale may be had at the Company's Offices, and Messrs. GEORGE ARMSTRONG and SONS, Solicitors, Newcastle-on-Tyne; or of the AUCTIONEER, 12, Hood Street, Newcastle-upon-Tyne.

GEORGE SMITH,
Secretary and General Manager.

Newcastle-on-Tyne,
June 9, 1903.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,

MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

THE
PETROLEUM GAS SYNDICATE
Supply and erect Complete Installations of their
PETROGENE PATENT GAS PLANT
On SALE, HIRE, or ROYALTY.

PETROGENE GAS is the most suitable Illuminant for all Towns, Villages, Factories, Institutions, &c., where a Cheap and Efficient Lighting System is required. It is equally suitable for Heating and Power purposes, and may be used with ordinary Gas Fittings, Stoves, Engines, &c. It may also be used in conjunction with Coal Gas, and affords Gas Companies a ready means of increasing their output without the expense of additional storage.

The Syndicate is prepared to entertain offers of sale of small Gas-Works, whether profit earning or not.

Offices: 23, Victoria St., Westminster.
Works: 10, Rochester Row, S.W.

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Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.
THE GRASSMOOR CO., LD.,
CHESTERFIELD.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
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LIMITED,
NEWBATTLE COLLIERIES,
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THE
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STATION METER.
Efficiency Demonstrated.
APPLY—
T. G. MARSH,
MAWSON CHAMBERS, DEANSGATE,
MANCHESTER.

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If you want genuine
FIREPROOF ASBESTOS PAINT,
there is ours you have not seen. Eggshell Gloss.
Ask for No. 2 Catalogue.
Gas-Fire Fuel.
Applications for Colonial & Foreign Agencies invited.
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Wellington Mills, BRADFORD, Yorks.
Telephone 950. Telegrams: "Asbestos, Bradford."

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Gas Engineers' Agents and Contractors for
METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.
Inquiries Solicited.
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Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
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And every description of Fire-Clay Goods.
RETORTS CAREFULLY PACKED FOR SHIPMENT.

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MANUFACTURERS OF
FILES OF BEST QUALITY
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STEEL OF ALL DESCRIPTIONS.
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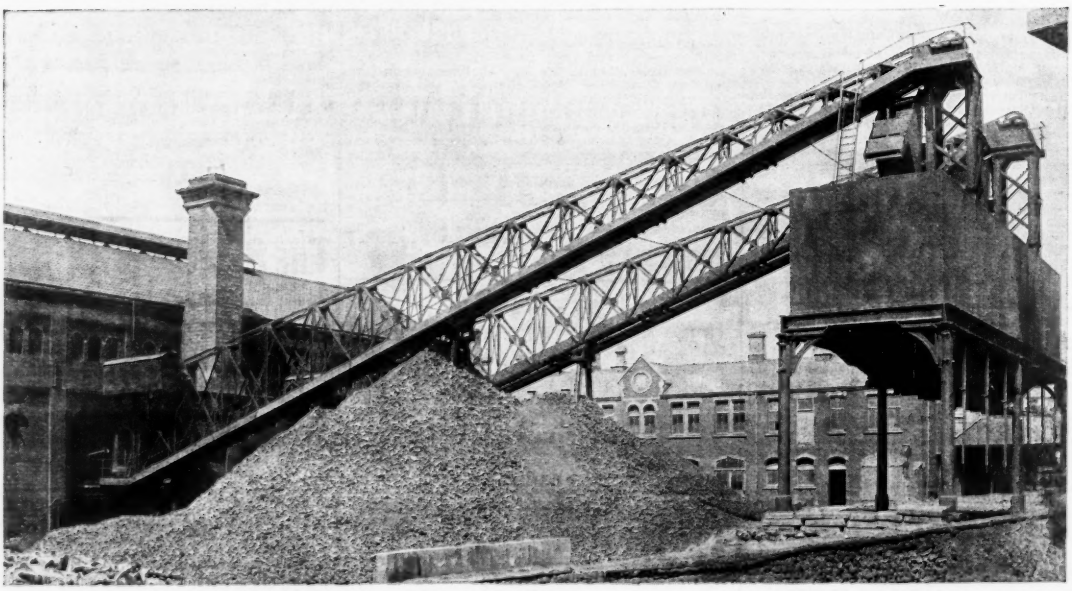
DE BROUWER PATENT HOT COKE CONVEYOR
GUARANTEED BY SOLE MAKERS.



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FIRE-CLAY & BRICK WORKS,
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Manufacturers of GAS-RETORTS GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.
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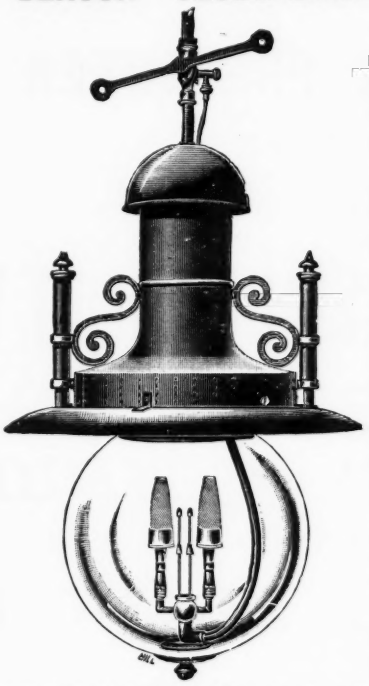
Prices and Analysis of all the Scotch Cannels on Application.

THE PATENT
"BEACON" GLOBE LAMP.



Largely adopted by many Local Authorities for Public Lighting, being absolutely Shadowless and Wind-proof.

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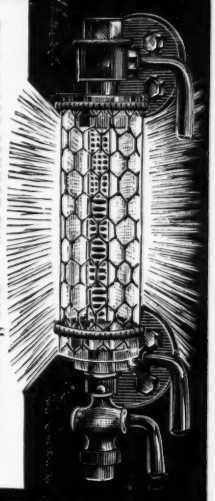
300 lbs. per Square Inch will not smash our WIRE EMBEDDED GLASS

GAUGE GLASS GUARD

THIS GLASS CANNOT FLY. THE "EVERTRUSTY."



Absolute protection for Stokers against Injury from flying glass.
Guards are transparent as water, and do not obstruct view of gauge glass.
Prices on application to the Makers and

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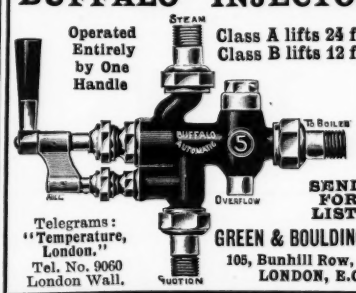
'BUFFALO' INJECTOR

Operated Entirely by One Handle



Class A lifts 24 ft.
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Telegrams: "Temperature, London." Tel. No. 9060 London Wall.

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Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

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FOR
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For use in the
RECOVERY OF SULPHUR,
Also Removal of last Traces of
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Full Particulars on application to the Patentees:
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THE "MENIER"
AUTOMATIC LIGHTER.

7000 in Use in Brussels.

12,000 in France and Belgium.

Patented in England, Germany, &c.
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Cie. Belge pour la Fabrication des Compteurs et Matériel Gaz, Eau, Electricité,
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In extensive use in English, Continental, and American Works.

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OIL-TANKS. CHEMICAL PLANT.

Makers of all kinds of Constructional Ironwork.

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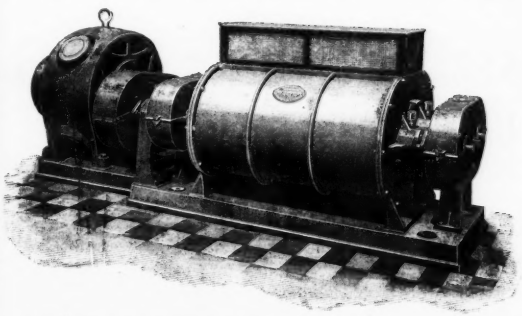
METHANE-HYDROGEN WATER-GAS PLANT.

3 gallons Tar and 20 lbs. Coke produce 1000 cubic feet 10 to 12 Candle Power Gas of the following composition—

Hydrogen	64·4 per cent.
Methane	12·0 „ „
Unsaturated Hydrocarbons	3·0 „ „
Carbon Monoxide	15·0 „ „
Nitrogen and Carbon Dioxide	5·6 „ „
	100·0
Calorific Value	400 B.T.U.

See **Prof. VIVIAN B. LEWES'S** Lecture before Society of Arts, reported in the "JOURNAL OF GAS LIGHTING," Dec. 9, 1902.

THWAITES BROS., LD.,



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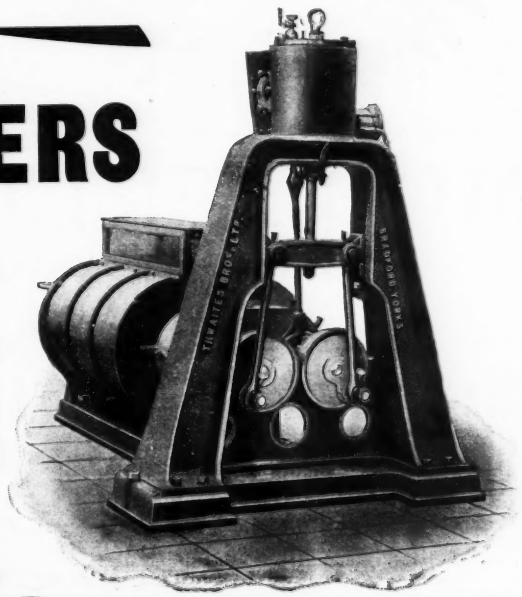

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IN ALL SIZES TO DELIVER UP TO

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Driven by Engine, Belt, or Motor.

SPECIALLY DESIGNED AND OF

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GAS MANUFACTURE.

Published Weekly

THE LUCAS LIGHT RECORDER

Price 0d

Issued in the interests of the Gas Industry and the finest high-power Gas Lamp known

No. 2.] [*Tuesday, July 21, 1903.*

The Laurels.

We thought so. The amount of congratulation and approval which has been showered upon us, is proof positive (to our mind) that we too have come to fill a yawning gap in the world's literature. The following letter is selected as a typical outburst of the exuberant feelings which our appearance has brought to the surface. For obvious reasons, our correspondent's name is left out, but he is a high authority on the matters of which he speaks.

Dear Mr. Editor,

Your enterprise has reconciled me with existence. I have been waiting patiently to see your lights shine by the thousand, instead of being placed by (and under) the proverbial bushel measure. Your wit has the brilliancy of the electric (sp)ark, though, of course, I recognize in it our dear old friend, gas. I feel sure that you are benefiting the gas industry more than yourself and the proprietors of your admirable journal, the only drawback of which is its diminutive size. I shall follow with the greatest interest what you have to say about lighting matters (of which you should be a judge), and I feel sure my colleagues will be wise enough to take your luminous advice.

Sincerely yours.

The Pros.

Of the Lucas Light: "The Light is the admiration of all who have seen it—it certainly is far and away before electric light."—Yours truly,

Edwd. Crook,
125, High Street,
Putney, S.W.

No. 1.

appeared last week in the "Gas World," where No. 3 will be published on Saturday week. All communications to be sent to Moffat's, Limited, 155, Farringdon Road, E.C.

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GAS ENGINEERS.

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REGENERATORS, GENERATORS, AND DIRECT-FIRED RETORTS.

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Give SPECIAL and PERSONAL ATTENTION to the execution of all orders

Large Stocks kept.

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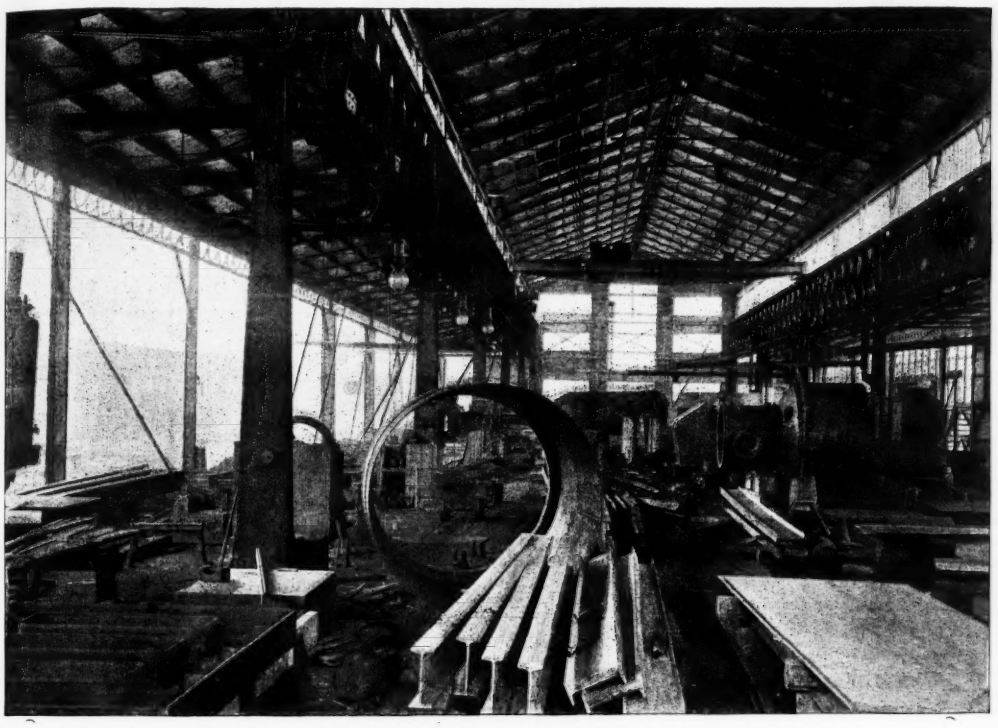

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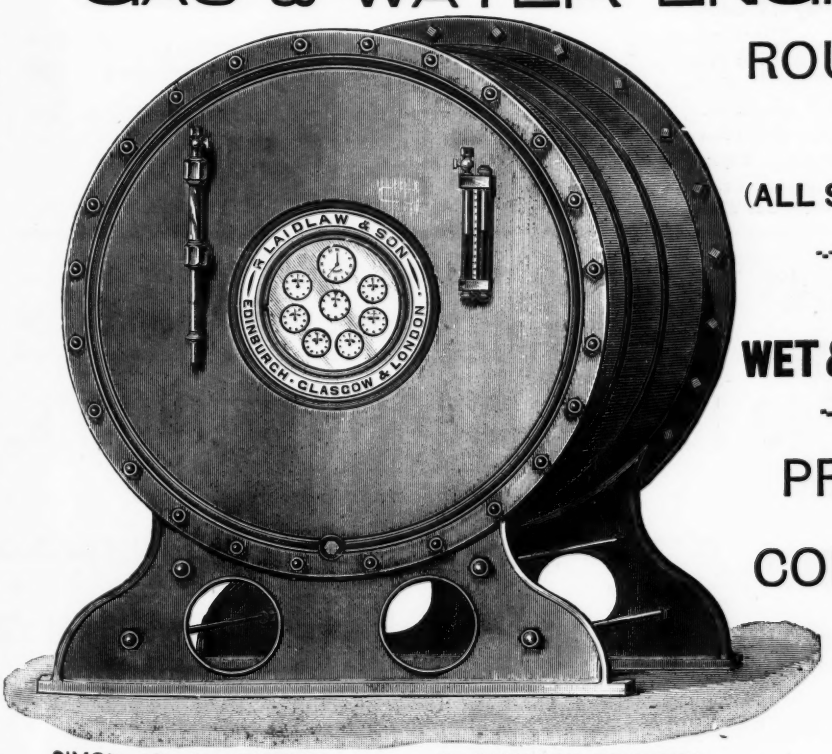

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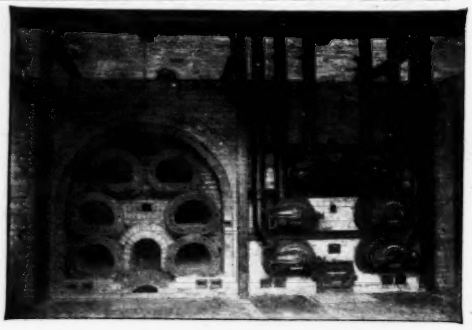
F. C. SUGDEN & Co.



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Maximum Make per Ton and Mouthpiece.

Minimum Fuel Consumption.

NUMEROUS REPEAT ORDERS

Have been received for each of the above types of Settings.

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Have been made in large quantities for the last twenty years; and during the whole of that time have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

Retorts carefully Packed for Export.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

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UPPER GROUND STREET, LONDON S.E.

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CAST-IRON RETORTS
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SOCKET-PIPES FOR GAS OR WATER PURPOSES.
FLANGE PIPES FOR STEAM.

Sole Manufacturers of LYON'S "PATENT" GAS-MAIN SYPHONS.

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MANUFACTURERS OF
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GAS-RETORTS,
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OF EVERY DESCRIPTION.

Also Manufacturers of Cast-Iron Retorts, Iron Mouthpieces, Pipes, and all necessaries for Gas-Works requirements.

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FOR
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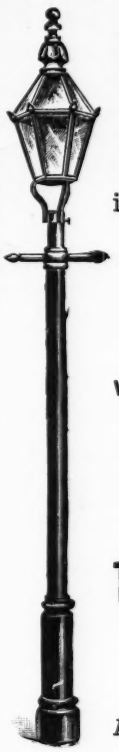

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WELDLESS STEEL SPIGOT & FAUCET PIPES for Gas and Water Mains.
Tubes can be supplied up to 10 inches diameter and in lengths up to 30 feet.
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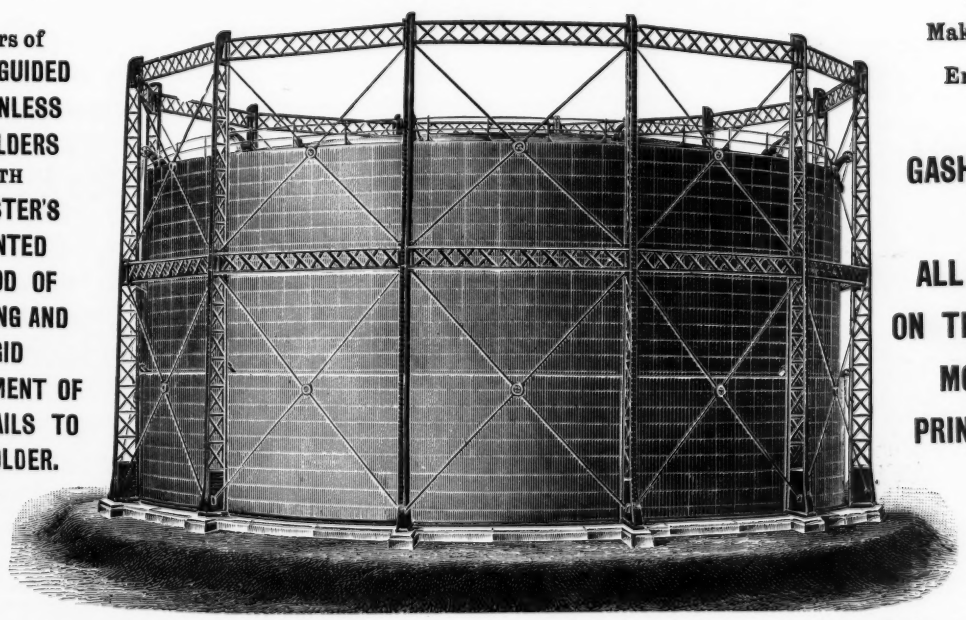

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